REPORT RESUMES

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REPORT OF THE INTERNATIONAL CLEARINGHOUSE ON SCIENCE AND MATHEMATICS CURRICULAR DEVELOPMENTS, 1967.

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REPORTED IS INFORMATION CONCERNING CURRENT PROJECT GROUPS THAT ARE DEVELOPING SCIENCE AND MATHEMATICS CURRICULAR MATERIALS. PROJECTS FROM THE UNITED STATES AND MORE THAN 30 OTHER COUNTRIES ARE INCLUDED. EACH PROJECT IS LISTED SEPARATELY. INFORMATION FOR EACH PROJECT INCLUDES (1) TITLE, (2) PRINCIPAL ORIGINATORS, (3) PROJECT DIRECTOR, (4) ADDRESS OF THE PROJECT HEADQUARTERS, (5) PROFESSIONAL STAFF, (6) PROJECT SUPPORT, (7) PURPOSES AND OBJECTIVES, (8) SPECIFIC SUBJECT AND GRADE LEVEL, (9) MATERIALS THAT HAVE BEEN PRODUCED, (10) HOW PROJECT MATERIALS ARE BEING USED, (11) LANGUAGE IN WHICH MATERIALS HAVE BEEN WRITTEN, (12) LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATIONS, (13) ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED, (14) MATERIALS AVAILABLE FREE, (15) PURCHASABLE MATERIALS, (16) SPECIFIC PLANS FOR EVALUATION OF MATERIALS, (17) SPECIFIC PLANS FOR TEACHER PREPARATION, AND (18) FUTURE PLANS. THIS DOCUMENT IS ALSO AVAILABLE AT NO COST (WHILE THE SUPPLY LASTS) FROM THE UNIVERSITY OF MARYLAND, SCIENCE TEACHING CENTER, COLLEGE PARK, MARYLAND 20740. (DS)

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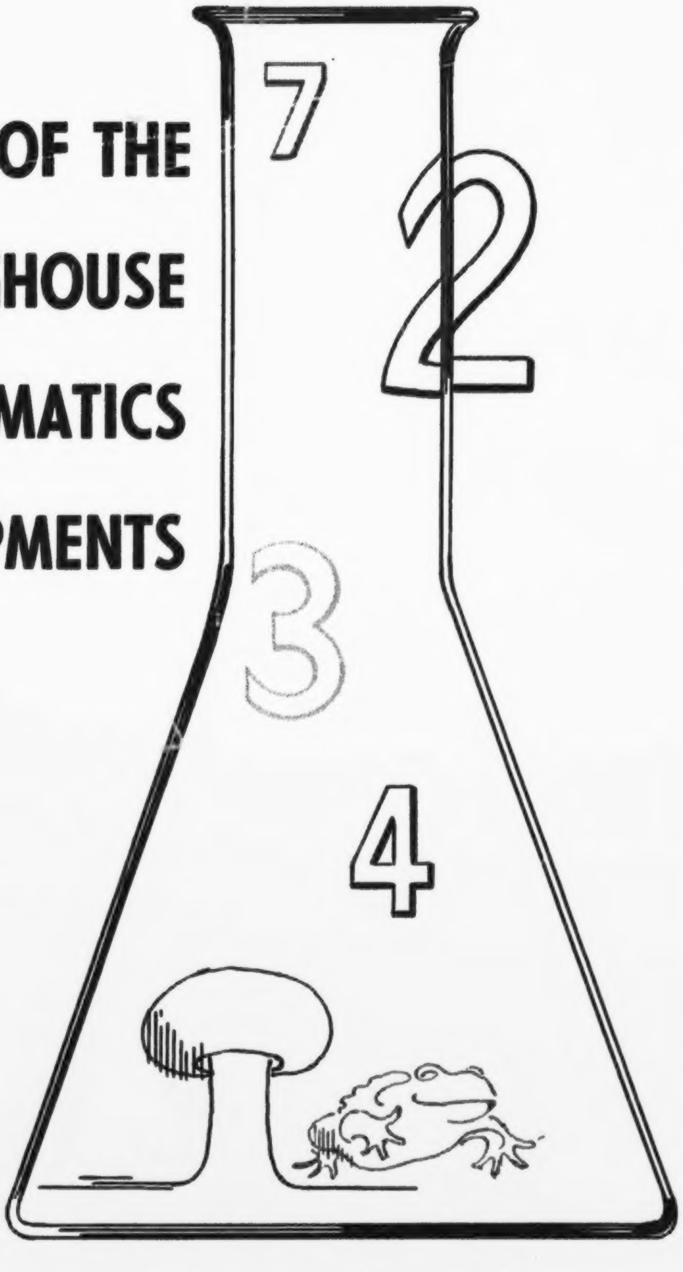
INTERNATIONAL CLEARINGHOUSE ON SCIENCE AND MATHEMATICS CURRICULAR DEVELOPMENTS

1967

COMPILED UNDER
THE DIRECTION OF
J. DAVID LOCKARD



A Joint Project of the

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University of Maryland

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INTRODUCTION

It is our pleasure to present this fifth in a series of annual reports dealing with curriculum developments in science and mathematics. The original operations of the Clearinghouse began in 1962 at the University of Maryland and each year since, a report has been issued. The first three reports were concerned only with projects in the United States. However, it soon became apparent as a result of increased overseas interest in American developments and increasing curriculum activity throughout many areas of the world, that an international treatment was warranted. Shortly thereafter, the Director met with Dr. Albert Baez and the UNESCO science education staff in Paris and with members of the National Science Foundation staff in Washington. As a result of these and other meetings the International Clearinghouse became a reality in 1965 and the fourth annual report was expanded to include curriculum developments throughout the world. Unfortunately, the supply of that and all earlier reports has already been exhausted.

The prime intent of the International Clearinghouse is to promote better understanding by helping to establish and maintain cooperative relationships among all the curriculum project participants throughout the world through dissemination of information on the science and mathematics curriculum activities. The fine cooperation from all individuals concerned has made the project the success it is and we hope that this cooperation will continue in the future.

The Report is designed to include projects of an on-going or recently influential nature that have relevance for others in science and mathematics curriculum work. Each year additional project summaries have been added to the report as their work progresses and some are deleted as their work has been completed. There are sometimes projects that are omitted, not by design but by lack of information, and it is hoped that the readers of this publication will furnish information on any projects that seem to fit the criteria. Since the report is being published several months earlier than it was last year, there has been a need to reprint some reports that appeared in the 1966 publication simply because the new information has not yet arrived at our Center. Apologies are given to any of the project directors who may have mailed new reports which have not yet been received by us. The information as printed is normally in the project director's own words as his response to a questionnaire sent by the Clearinghouse Director. If additional information is needed on any one project the reader is asked to contact the project directors themselves. Although a master set of materials is maintained at the Information Clearinghouse for perusal by any visitors to the Center, we do not maintain any stocks of sample materials and these can only be furnished by the project directors.

The International Clearinghouse is one activity of the Science Teaching Center of the University of Maryland and is carried out as a joint project with the Commission on Science Education of the American Association for the Advancement of Science and the National

Science Foundation. A description of the total operation of the Science Teaching Center is included on a following page in answer to numerous requests from readers trying to understand our overall operation. We encourage visitors to come to the Science Teaching Center to see the International Clearinghouse part of our operation, as well as our other activities, such as our reviewing of science teaching materials for the National Science Teachers Association.

Acknowledgments to individuals who assist in this Report must, of necessity, be many. Obviously, the report could not exist without the fine cooperation of the project directors and their staffs. We are particularly indebted to them. In addition, there are the numerous individuals associated with organizations who have furnished materials, as well as names and addresses of those to whom we should write. This group would include those on the staffs of the American Association for the Advancement of Science, the International and the Course Content Improvement Section of the National Science Foundation, the United States Office of Education, the President's Office of Science and Technology, the United States State Department, the Organization for Economic Cooperation and Development, the Pan-American Union, many foreign embassies, and the staff at UNESCO in Paris. The persons who did much of the work putting this fifth Report together are two members of my staff at the Science Teaching Center, Harold Gray and Maria Penny. I am particularly indebted to them for this activity and to our two fine secretaries, Mrs. Sharon Dorman and Mrs. Louise Wells, who handled the final typing as well as the rough copy of the Report. In addition, since our International Clearinghouse is only a part of our year-round operation, we are indebted to our Science Teaching Center colleagues who interact with this project and frequently host our guests. These staff members include Glenn Blough, Carolyn Boyette, Philip DiLavore, Richard Ehrbaker, Marjorie Gardner, Marlene Murray, Herman Ruoff, Sherry Shearer, and David Williams. Without the combined help of all these individuals, our Center operation could not be the success it is. Any credit for the value of this report should go to the staff. Any criticisms and constructive suggestions should come to the Clearinghouse Director.

Single copies of this 1967 Report will be furnished free to an individual as long as the supply lasts. Such requests should be addressed to Dr. J. David Lockard, Director, International Clearinghouse on Science and Mathematics Curriculum Developments, Science Teaching Center, University of Maryland, College Park, Maryland, U. S. A. 20740.

J. David Lockard, Director
International Clearinghouse

College Park, Maryland
May, 1967

The University of Maryland Science Teaching Center

The International Clearinghouse is located in the University of Maryland Science Teaching Center at College Park, Maryland. Designed to serve as a representative facility of its type, the functions of the Science Teaching Center include teacher and supervisor training, graduate education, basic research in science education, and consultative services. In addition to the Clearinghouse activities, the Center staff reviews and displays the latest in science teaching materials for the National Science Teachers Association. The reviews are published each month in the Association's two journals, *The Science Teacher* and *Science and Children*.

The numerous and varied activities of the Science Teaching Center have resulted in a generous and advantageous expansion of facilities. With the new additions nearing completion, the Center will have two modern, classroom-type science laboratories with adjacent demonstration preparation areas and storage areas. Conference facilities will be available for both large and small groups. An expanded library will feature relevant periodicals, science textbooks, new curriculum materials and works on science pedagogy and its operational aspects. A fully equipped research laboratory will provide project space for both faculty and students. In addition to the complete photographic and audio-visual facilities already available, the Center will feature some of the latest technological developments in science education, including closed circuit television, a sample audio-tutorial set-up and provision for eventual connection to a computer facility. The International Clearinghouse archives will occupy another expanded area adjacent to the Center library. On file here are the latest materials from both national and international science and mathematics curriculum projects. Every attempt is made to keep the collection as comprehensive as possible and it is believed to be one of the most up-to-date collections of such materials in the world.

Each year the Science Teaching Center is host to large numbers of domestic and foreign visitors. Its close proximity to Washington, D.C., and the leading science and educational organizations of the country serves to stimulate such visits while insuring valuable cooperative links for the advancement of science education. Since it is a basic aim of the Clearinghouse to promote international cooperation through the dissemination of information, the Center shall continue to welcome and to aid visitors of every nation in all areas and at all levels of science and mathematics education.

To arrange a visit or to obtain additional information, please contact Dr. J. David Lockard, Director, Science Teaching Center, University of Maryland, College Park, Md. 20740. Tel. 301-454-2024.

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A. PROJECT TITLE: AFRICAN MATHEMATICS PROGRAM

B. PROJECT DIRECTOR: Mr. Hugh P. Bradley, African Mathematics Program, Educational Services Incorporated, 55 Chapel Street, Newton, Mass. 02158, Tel. 617-969-7100

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above.
b. Facilities available for viewing: Copies of materials; literature about the program.

D. PRINCIPAL PROFESSIONAL STAFF: The African Mathematics Program employs, on a consulting basis, a staff of African and American mathematicians at Workshops each summer in Africa to develop mathematics course materials. Some of these people also lecture in institutes to train African teachers to use the new materials. The activities are carried out under the direction of a Steering Committee of African and American members. The Executive Committee consists of Robert Dilworth, California Institute of Technology; W. T. Martin, M.I.T. (Chairman); Christopher Modu, West African Examinations Council, Accra Ghana; Walter Prenowitz, Brooklyn College; Onyerisara Ukeje, University of Nigeria, Nsukka, Eastern Nigeria; Awadagin Williams, Fourah Bay College, Freetown, Sierra Leone.

E. PROJECT SUPPORT:
a. Organizational sponsorship: Educational Services Incorporated.
b. Funding agencies: United States Agency for International Development; Ford Foundation.

F. PROJECT HISTORY:
a. Principal originators: J. R. Zacharias, M.I.T.; W. T. Martin, M.I.T.
b. Date and place of initiation: 1960; Cambridge, Mass.
c. Reason for initiation: To develop a modern mathematics program from Standard I to School Certificate for English-speaking African countries.

G. PRESENT COMMERCIAL AFFILIATIONS: Science Research Associates, Chicago, Ill.; Science Research Associates Ltd., England.

H. PURPOSES AND SPECIFIC OBJECTIVES: Following a conference attended by African, American and British educators in 1961, it was decided to initiate curriculum reform programs for Africa. In particular, programs in mathematics, science, social studies and teacher training were recommended. It was felt that the work of curriculum reform in mathematics in the U.S.A. and in Britain was sufficiently advanced to make possible a positive contribution to African education; thus a program for the reform of the teaching of mathematics from Standard I up to School Certificate was undertaken. It is the aim of the program to produce new mathematics material in the following four areas: text materials for primary school, text materials for secondary school, text materials for African teacher training colleges, and tests and examinations based on these materials.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics; primary, secondary, and teacher training materials.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Primary One; Revised Preliminary Edition, Pupil Book, One volume; Teachers' Guide, Two volumes
2. Primary Two; Preliminary Edition, Pupil Book, Two Volumes; Teachers' Guide, Two volumes
3. Primary Three; Preliminary Edition, Pupil Book, Two Volumes; Teachers' Guide, Two Volumes
4. Primary Four; Preliminary Edition, Pupil Book, One Volume; Teachers' Guide, One Volume
5. Primary Five; Preliminary Edition, Pupil Book, One Volume; Teachers' Guide, One Volume
6. Primary Six; Preliminary Edition, To be written at 1967 workshop
7. Primary Seven, Preliminary Edition, To be written at 1968 Workshop
8. Entebbe Mathematics Teachers' Handbook, Primary I-III, Preliminary Edition
9. Entebbe Mathematics Teachers' Handbook, Primary IV-VII, Preliminary Edition, to be written at 1967 Workshop

Four Year Course:

10. Secondary C One, Preliminary Edition; Student Text, Algebra, One Volume; Geometry, One Volume; Teachers' Guide, Algebra, One Volume; Geometry, One Volume
11. Secondary C Two, Preliminary Edition; Student Text, Algebra, One Volume; Geometry, One Volume; Teachers' Guide, Algebra, One Volume; Geometry, One Volume
12. Secondary C Three, Preliminary Edition; Student Text, Algebra, One Volume; Geometry, One Volume; Teachers' Guide, Algebra, One Volume; Geometry, One Volume
13. Secondary C. Four, Preliminary Edition; Student Text, One Volume; Teachers' Guide, One Volume.

Five Year Course:

14. Secondary One, Preliminary Edition; Student Text, One Volume; Teachers' Guide, Three Volumes
15. Secondary Two, Preliminary Edition; Student Text, Three Volumes; Teachers' Guide, Three Volumes
16. Secondary Three, Preliminary Edition; Student Text, Algebra, One Volume; Geometry, One Volume; Teachers' Guide, Algebra, One Volume; Geometry, One Volume
17. Secondary Four, Preliminary Edition; Student Text, Algebra, One Volume; Geometry, One Volume; Teachers' Guide, Algebra, One Volume; Geometry, One Volume
18. Secondary Five, Preliminary Edition; Student Text, One Volume; Teachers' Guide, One Volume
19. Additional Mathematics (O level), Preliminary Edition, to be written at 1967 Workshop
20. Advanced Mathematics (A level), Preliminary Edition, to be written at 1968 Workshop
21. Basic Concepts of Mathematics, an Introductory Text for teachers: Volume I - Revised Preliminary Edition - Structure of

Arithmetic; Volume II - Revised Preliminary Edition - Structure of Arithmetic; Volume III - Preliminary Edition - Foundations of Geometry; Volume IV - Preliminary Edition - Measurement, Functions, and Probability.

K. MATERIALS AVAILABLE FREE: Materials listed in question J are available for limited trial use to the Ministries of African countries participating in the program. Inspection sets of the materials are available to interested educators from Educational Services Incorporated, 55 Chapel Street, Newton, Mass. 02158.

L. MATERIALS PURCHASABLE: Primary One Pupil Book, One Volume, Price: 5/6; Primary One Teachers' Guide, One Volume, Price: 15/-; available from: Science Research Associates Ltd., Henley-on-Thames, Oxfordshire, England

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGE INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Swahili

O. USE OF PROJECT MATERIALS: Number of experimental calsses: 900. For specific schools consult Ministries of Education in the following countries, or write to the Project Director: Ethiopia, Ghana, Kenya, Liberia, Nigeria, Malawi, Sierra Leone, Tanzania, Uganda, Zambia, Zanzibar.

P. MATERIALS PRESENTLY BEING DEVELOPED: At the 1967 Workshop it is intended to prepare the following materials: Primary 6, Teachers' Handbook IV-VII, Additional Mathematics (O level), and tests for Secondary C Two and Primary 4.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The first residential period of a two year institute was held at University College, Nairobi, Kenya, during the summer of 1966. The aim of the institute is to make available in each of the participating countries a group of well trained people, knowledgeable about modern mathematics who would be able to assume responsibility for training teachers locally, and who could offer leadership in producing and evaluating new textual materials. Participants are now taking a correspondence course. They will return to Nairobi for another four week institute during the summer of 1967 and then take another correspondence course.

In addition, at the request of Ministries of Education in the participating countries, the program conducts short courses staffed by African and American mathematics consultants to train teachers of trial classes using the Entebbe Mathematics Series.

R. PROJECT EVALUATION:

a. Instruments used: A series of achievement tests is being developed covering the secondary course. Tests to measure the depth of understanding of new concepts are being developed for Standard 3 level. This test should be useful for a comparative study of the socio-economic and more general educational effects of the program.

b. Control groups: None described

c. Feedback process: Reports from teachers, formal and informal; visits by mathematics consultants to the classes, and reports from Ministries of Education.

d. Behavioral objectives identified: None described.

e. Research evidence of objectives achieved: None described.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Materials prepared at the 1966 Workshop are being printed and will be soon available for trial use in participating countries. Correspondence course part of the two-year teacher training institute being carried on as followup to four week residential institute in Nairobi during the summer of 1966. Preparation and planning for 1967 Workshop and second residential period of teacher training institute now in progress.

T. PLANS FOR THE FUTURE: 1967 Mathematics Workshop to be held at Nyali Beach Hotel, Mombasa, Kenya, July/August. 1967 Second Residential period of teacher training institute to be held at University College, Nairobi, Kenya, July.

A. PROJECT TITLE: AFRICAN PRIMARY SCIENCE PROGRAM

B. PROJECT DIRECTOR: Ralph H. Robins, Educational Services, Inc., 55 Chapel Street, Newton, Mass. 02158, Tel. 617-969-7100

C. PROJECT HEADQUARTERS:
   a. Address: Same as "B" above.
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: All Professional staff (6 Science Educators) located in various African countries.

E. PROJECT SUPPORT:
   a. Organizational sponsorship: Educational Services, Inc.
   b. Funding agencies: AID, Ford Foundation

F. PROJECT HISTORY:
   a. Principal originator: J. A. Zacharias
   b. Date and place of initiation: February 1965; Kano, Northern Nigeria
   c. Reason for initiation: To introduce modern science into Africa

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: This is a research program designed to determine to what extent new ideas and methods for teaching science, particularly the so called "discovery" method developing in the United States, United Kingdom and elsewhere, are applicable in Africa. Specifically in Sierra Leone, Liberia, Ghana, Nigeria, Kenya, Tanzania, Uganda, Malawi, Zambia, Lesotho.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Primary School Science

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   Unit 1. Ask the Ant Lion
   2. Powders
   Other units in mimeographed form only.

K. MATERIALS AVAILABLE FREE: None - except samples

L. MATERIALS PURCHASABLE: None as yet

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Not known as yet

O. USE OF PROJECT MATERIALS: The materials do not constitute a course yet; a few select teachers in Africa are using the materials prepared.

P. MATERIALS PRESENTLY BEING DEVELOPED: Additional primary science units on a variety of topics pertinent to Africa.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Since the program is basically a research program, teacher training is not appropriate on a widespread basis. It is only considered to see to what extent African teachers can handle new science materials. Training work to date has been limited to teacher training institutions largely.

R. PROJECT EVALUATION: Evaluation plans are just beginning to be considered.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Summer workshop: July-August 1966 Dar Es Salaam, Tanzania for the preliminary writing of new materials; Writing conference: February 1967, Accra, Ghana

T. PLANS FOR THE FUTURE: Summer workshop, 1967, West Africa; Preparation of small number of additional printed units following trial testing; Establishment of science curriculum development centers in various countries.

A. PROJECT TITLE: SCHOOL MATHEMATICS PROJECT OF EAST AFRICA. (SMPEA)

B. PROJECT DIRECTOR: T. D. Morris, School Mathematics Project of East Africa, P. O. Box 5881, Nairobi, Kenya, Tel. Nairobi 24843

C. PROJECT HEADQUARTERS:
  a. Address: Same as "B" above.
  b. Facilities available for viewing: None except school visits

D. PRINCIPAL PROFESSIONAL STAFF: T. D. Morris

E. PROJECT SUPPORT: School Mathematics Project of U. K.

F. PROJECT HISTORY:
  a. Principal originator: Bryan Thwaites, Professor, University of Southampton, U. K.
  b. Date and place of initiation: 1961; Southampton University
  c. Reason for initiation: Deplorable state of school mathematics

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: As in U. K.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics throughout secondary education; Form I-VI; Age Levels 12 - 21 years

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
  1. S.M.P.E.A. Book I Draft Form
  2. S.M.P.E.A. Book II Draft Form

K. MATERIALS AVAILABLE FREE: Answer sheets to items 1 and 2

L. MATERIALS PURCHASABLE: Item 1, Shillings 13/50; Item 2, Shillings 14/50; Educational Supply Association Limited, P. O. Box 30167, Nairobi

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: 400
  b. Some specific schools where course is being taught: Alliance High School, P. O. Box 7, Kikuyu; Shimo-La-Tewa, P. O. Box 1617, Mombasa; Kings College School, Budo, Kampala, Uganda; Brantyre High School, Malawi.

P. MATERIALS PRESENTLY BEING DEVELOPED:
  3. Book Three now being written by seven East African Authors.
  4. Book One Final Form now being written by six East African Authors; different authors from above.
  5. Teacher's Guide to Book One being prepared.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Training courses in Nairobi, '65, '66, '67, '68, '69, '70. In Brantyre '67 through '70. Also in Dar-Es-Salaam, Moshi Mombasa, Kampala; in addition to weekly lectures to teachers at various centres in East and Central Africa.

R. PROJECT EVALUATION: As in U. K.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Draft Book Three out in November 1967. Draft Books and Teacher's Guides to remaining books to follow at twelve (12) monthly intervals. Writing conference annually - December and March. A Set of Illustrative Posters are being considered.

A. PROJECT TITLE: UNESCO PILOT PROJECT ON NEW APPROACHES AND TECHNIQUES IN BIOLOGY TEACHING IN AFRICA

B. PROJECT DIRECTORS: Prof. Ralph Buchsbaum, Department of Biology, University of Pittsburgh, Pittsburgh, Pa. U.S.A.; Mrs. Anne Hunwald, UNESCO, Division of Science Teaching, Department of Advancement of Science, Place Fontenoy, Paris 7, France

C. PROJECT HEADQUARTERS:

a. Address: UNESCO, Division of Science Teaching, AVS, Place Fontenoy, Paris 7, France, Contact: Mrs. Anne Hunwald

b. Facilities available for viewing: At present, only general documentation at UNESCO Headquarters, including a selection of material provided for African participants in the project; As from 15 September 1967, an International Working Group (comprising a staff of high level specialists, and about 25-30 African participants will produce prototype teaching material at Cape Coast University College, Cape Coast, Ghana (until 17 July 1968).

D. PRINCIPAL PROFESSIONAL STAFF: Prof. Ralph Buchbaum, Director; Prof. D. F. Owen, Deputy Director; Mr. Jovanovic, Film specialist; Robert Lewis, Cheap laboratory equipment production; Mr. Kelly, Genetics; Prof. O. Sazonova, Microbiology; Prof. Puri, Plant Physiology; L. Biran, Biochemistry and programmed instruction; Mr. D. Lehman, Mr. H. Steiner, Laboratory work; M. Miller, Use of isotopes; Mr. Markham, Agricultural aspects.

E. PROJECT SUPPORT: UNESCO

F. PROJECT HISTORY:

a. Principal originators: UNESCO

b. Date and place of initiation: April 28, 1966; UNESCO, Paris

c. Reason for initiation: to help up-grade the competence of biology teachers in Universities and Higher Teacher training college in the adequate training of secondary (high) school biology teachers in Africa. (The project is part of a series of similar UNESCO activities started earlier in the fields of physics (in Latin America), chemistry (in Asia), to be followed in 1969 by a mathematics project for Arab States.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The project does not propose to advocate any precise curriculum in biology, but is intended to provide UNESCO's Member States with prototype material, modern in content and with regard to teaching methods (text material, loops, films, laboratory equipment) to be used as source material for producing new textbooks, visual aids and equipment adapted to specific local needs. At the same time, it provides training opportunities for university level biologists, in charge of teacher training, in methods related to curriculum reform, classroom experiments, textbook writing, film and loop production, etc., including assessment of results. It is hoped that, as an outcome of the Project participating countries will use biologists involved in the project for setting up permanent centres for biology teaching improvement (curriculum reform, material production, in-service training, etc.)

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Biology (age group 11 to 18, normally, i.e. post-primary level up to entrance to University.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: Material production will be elaborated at a Planning Seminar held at Cape Coast University College (Ghana) from 15 to 24 February 1967.

K. MATERIALS AVAILABLE FREE: Mimeographed documentation obtainable from UNESCO (see C above).

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Materials will be written in English in 1967-68, to be translated into French in the second part of 1968.

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: French

O. USE OF PROJECT MATERIALS: Material not yet used, except for internationally collected material pertinent to improved biology teaching distributed to those participating in the project.

P. MATERIALS PRESENTLY BEING DEVELOPED: See J above.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The project is meant to familiarize biologists responsible for secondary school teacher training with up-to-date teacher training methods, and planning of adequately conceived programmes with regard to content. At present 33 African countries are already collaborating, and it is expected that within the coming few months most if not all African countries will participate in the project.

R. PROJECT EVALUATION:

a. Instruments used: Questionnaires to assess present situation in biology teaching in Africa. Later, visits of qualified biologists will assess progress in participating countries. When the material produced by the Project will become available, classroom experiments will be conducted.

b. Control groups: Detailed plans for evaluation will be drawn up at the preparatory Seminar (see J above)

c. Feedback process: All data on evaluation will be collected and studies at UNESCO Headquarters, jointly between the Advancement of Science and Social Sciences Departments. During the week of the "International Working Group" in Ghana (see C) feedback will be provided by associated "Study Groups" set up in all participating African countries.

d. Behavioral objectives identified: Ability of teachers to give an integrated instruction in biology, whereby the basic concepts of present day biology can be understood; involve students in active participation (inquiry and discovery approach).

e. Research evidence of objectives achieved: Results obtained by the Pilot Projects already in an advanced stage of development (see F) provide encouraging evidence of improvement in the content and methods of teaching of those who participate in the project.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** In 1966: Letters and visits to African countries, in order to set up permanent national study groups in Africa, affiliated with the project; provision of study material for groups established. Fellowships provided for study group members to visit some well known curriculum research centres in the world, and obtain training in their methods.

Since January 1967: provision of material for the 33 study groups established; recruitment of staff to guide the International Working Group; completion of preparation for the planning seminar (see J) to start on 15 February.

T. **PLANS FOR THE FUTURE:** Select participants for, and organize the work of the "International Working Group" for English speaking African Countries (15 September 1967 - 17 July 1968) in Ghana; prepare for the organization of a similar Working Group for French speaking African countries in 1969-1970, produce text and other prototype material (see H above) and translate same into French. Organize visiting biologists' programmes to study groups working in the various African countries, and promote establishment of further study groups.

A. PROJECT TITLE: WEST AFRICAN EXAMINATIONS COUNCIL "A" LEVEL CHEMISTRY SYLLABUS

B. PROJECT DIRECTORS: R. E. Pearson, Dept. of Chemistry, Univ. of Ghana, Legon, Ghana; J. B. Redhead, Dept. of Chemistry, Univ. of Ibadan, Ibadan, Nigeria.

C. PROJECT HEADQUARTERS:
   a. Address: Either of above.
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: None

E. PROJECT SUPPORT:
   a. Organizational sponsorships: West African Examinations Council (for development of syllabus): Ghana Association of Science Teachers; Science Teachers Association of Nigeria.
   b. Funding agencies: National Ministries of Education (for support of refresher courses).

F. PROJECT HISTORY:
   a. Principal originators: West African Examinations Council and Ghana Association of Science Teachers.
   b. Date and place of initiation: April, 1964, Ghana.
   c. Reason for initiation: The West African Examinations Council expected to replace the London 'A' Level syllabus then in use in Nigeria, Ghana, Sierra Leone, and The Gambia, by its own syllabus. The Ghana Association of Science Teachers was anxious that the new syllabus should provide a much more up-to-date approach and content than the old, and as a result, formed a Working Party to make proposals for a new syllabus to W.A.E.C.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The syllabuses having been accepted, our next aim is to develop materials for the use of the teachers and students. The most immediate need is to find and develop suitable experiments for use in the laboratory program.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Chemistry; 'A' Level (corresponds to London GCE Advanced Level or Cambridge Higher School Certificate); Age: minimum 16 to 18 years.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Syllabuses for theory and laboratory work.
   2. Specimen examination papers.

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: Nos. 1 and 2, from West African Examinations Council, Private Post Bag, Accra, Ghana. Price unknown.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No others.

O. **USE OF PROJECT MATERIALS:** The syllabus is in use in Nigerian secondary schools.

P. **MATERIALS PRESENTLY BEING DEVELOPED:**
   3. Laboratory experiments.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Refresher courses for teachers were held at Ibadan, Nigeria (March, 1966) and Cape Coast, Ghana (Dec., 1966). These courses stressed the content of the new syllabus. Future courses will emphasize laboratory work.

R. **PROJECT EVALUATION:** None, so far.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** We have run two refresher courses, and have started to plan the development of the laboratory program.

T. **PLANS FOR THE FUTURE:** As outlined in sections above.

A. PROJECT TITLE: DEPARTMENT OF EDUCATIONAL TELEVISION SINCE AUGUST 1965. TILL THAT DATE THERE WAS A COMMISSION OF EDUCATIONAL TELEVISION, WHICH WAS PROVISIONAL.

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: Original decision and direction of the project belong to the Dean of the Faculty of Exact and Natural Sciences, Dr. Rolando V. García. The project began at the end of 1962.

C. PROJECT DIRECTOR: J. Manuel Calvelo Ríos.

D. PROJECT HEADQUARTERS ADDRESS: Faculty of Exact and Natural Sciences, Perú 272, Buenos Aires, Argentina.

E. PROFESSIONAL STAFF: J. Manuel Calvelo Ríos, Director of the Department; Ricardo A. Romanelli, Assistant Head; Hugo Malajovich, Producer; 5 technicians in electronics for the operation and maintaining of the equipments; 14 experts in pedagogical production, including photography, animations, cameras, lighting, etc. They are all advanced students or licenciados in careers of the Faculty of Sciences or the Faculty of Humanities. They were taught in the Department.

F. PROJECT SUPPORT:

a. Organizational sponsorship: Budget of the Faculty of Sciences.
b. Funding agency: Initial support of the Ford Foundation, for the purchase of the first equipments.

G. SPECIFIC PURPOSES AND OBJECTIVES: To solve the problem created for the great growing of the pupils in the Preparatory Course of the Faculty, which went from 600 students in 1956 to 2800 students in 1966; to improve pedagogical processes at different levels; to be used as a complementary pedagogical element in experimental and instrumental courses; in courses with a great number of pupils, and in those requiring observations in the field (Geology and Biology).

H. SPECIFIC SUBJECTS AND GRADE LEVEL: The level is higher to the one of the secondary teaching, but it doesn't reach the university one. The Preparatory Course, in which our efforts are now focused, is a pre-university course, of vocational guidance. It encompasses four subjects: Mathematics, Physics, Chemistry, and Natural Sciences (Geology and Biology). In the first three and in Biology, the themes are those of the secondary school, but they are given from another point of view. In Geology, which is not taught in the secondary school, we try to give the pupils a wide vision of what Geology is and what the work of a geologist is like.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. A course on Physics - 41 classes.
2. A course on Geology - 8 classes.
3. A course on Chemistry - 25 classes (it is being finished).

J. USE OF PROJECT MATERIALS: These courses are attended by approximately 2000 students.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Spanish

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Classes taped in video tape recorder can be translated into any language.

M. MATERIALS PRESENTLY BEING DEVELOPED:

4. A course on Biology, which is in the stage of previous study.
5. A course on Mathematics, not yet begun.
6. A course on Physics Laboratory, not yet begun.

N. MATERIALS AVAILABLE FREE: Presently, the budget difficulties of the University do not allow us to offer free materials. If any interest is had on samples of the courses, we will study the possibilities.

O. MATERIALS PURCHASABLE: If asked, we could have film copies (cinescopio) of the courses of Geology and Chemistry within four months. The Physics Course is still being revised. Costs have not been calculated yet. With the courses will be included texts and instructions for the assistants.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: A complete system of evaluation of the courses is being prepared.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None described.

R. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

S. PLANS FOR THE FUTURE: If budget situation allows it, we hope to finish the Preparatory Course; to prepare auxiliary courses for university teaching; programmes of vocational guidance; programmes for the teaching of audiovisual technics.

A. PROJECT TITLE: THE UNESCO PILOT PROJECT FOR CHEMISTRY TEACHING IN ASIA

B. PROJECT DIRECTOR: Dr. E. Watton, P. O. Box 1425, UNESCO, Bangkok, Thailand

C. PROJECT HEADQUARTERS:
  a. Address: Located in Chemical Technology Building, Chulalongkorn University, Bangkok, Thailand, Contact: Project Director
  b. Facilities available for viewing: Visitors always welcome

D. PRINCIPAL PROFESSIONAL STAFF: E. Watton, Director; Mr. Segaller, Film Consultant

E. PROJECT SUPPORT: Thai Government and UNESCO

F. PROJECT HISTORY:
  a. Principal originators: UNESCO
  b. Date and place of initiation: September 1965; Bangkok
  c. Reason for initiation: Chemistry teaching reform

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To produce resource materials for distribution to Asian Study Groups interested in Chemistry Teaching reform. The resource materials are produced by Asian participants at the Project working with expert UNESCO Consultants.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Chemistry: High School and First Year University

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
  1. Teaching Sequence on Stoichiometry
  2. Programmed Instruction on Stoichiometry
  3. Teacher's Guide for Programmed Instruction
  4. Set of Film Loops and Teacher's Guide

K. MATERIALS AVAILABLE FREE: Items 1, 2 and 3 are available free.

L. MATERIALS PURCHASABLE: Item 4 is available at an approximate cost of some $60 (US) per set.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed

O. USE OF PROJECT MATERIALS: Not known.

P. MATERIALS PRESENTLY BEING DEVELOPED: 5. A Teacher's Digest on factors affecting compound formation. This will arise as the proceedings of a Summer Institute to be run in April of this year (1967) at the Project.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Above Summer Institute will include L. Strong, Earlham College, U.S.A.; Prof. A. Hambly, Australian National University, Canberra, A.C.T. Australia; Mr. G. Aylward, University of Macquarie, N.S.W. Australia; Prof. G. Barclay, University of Macquarie, N.S.W. Australia; Dr. D. Graddon, University of New South Wales, Australia; Dr. B. Craven, University of New South Wales, Australia; Prof. J. Millen, University College, London; Prof. Zyka, Charles University, Czechoslovakia.

R. PROJECT EVALUATION:

a. Instruments used: None described

b. Control groups: None

c. Feedback process: Recipients of resource materials are requested to use, discuss and report back to the Project.

d. Behavioral objectives identified: None described

e. Research evidence of objectives achieved: None described

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Preparation for Summer Institute.

T. PLANS FOR THE FUTURE: Extention through to 1968.

A. PROJECT TITLE: EDUCATION DEPARTMENT OF VICTORIA TECHNICAL SCHOOLS' SCIENCE COURSES, FORMS 1-4*

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: E. T. Jackson; R. A. Armitage, 1960

C. PROJECT DIRECTOR: R. A. Armitage.

D. PROJECT HEADQUARTERS ADDRESS: Technical Schools' Branch, Education Department of Victoria, Treasury Place, Melbourne, C. 2, Australia.

E. PROFESSIONAL STAFF: David Cohen, Research Officer, Education Department; G. Burmeister, Head of Science Dept.; J. Thomas, Chemistry Teacher/Lecturer in Science Method; G. Shirreff, Head of Science Dept.; R. Grose, R. Chapman, B. O'Neill, Science Teachers.

F. PROJECT SUPPORT: Education Department.

G. SPECIFIC PURPOSES AND OBJECTIVES: To develop general science courses for Forms 1-4 (i.e., grades 7-10) for all pupils (girls and boys) attending the state's eighty technical schools.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: General Science, grades 7-10.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. Science Syllabus Form 1.
2. Science Syllabus Form 2.
3. Science Syllabus Form 3.
4. Science Syllabus Form 4.

J. USE OF PROJECT MATERIALS: Approximately 600 teachers are using complete program, and probably 100 are using portions of it. Specific schools where materials are used: Preston East Technical School; Fawkner Technical School; Coburg Technical School; Geelong West Technical School.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: Accompanying sample external tests.

N. MATERIALS AVAILABLE FREE: Single copies of each syllabus, in limited numbers. Write Technical School Branch, Education Department.

O. MATERIALS PURCHASABLE: None

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Pre-trials in six schools, and modified on basis of teachers' subjective feedback. Limited resources available prevent adequate valid evaluation materials from being developed.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The Science Teachers' Association of Victoria has organized several seminars and meetings. Otherwise, syllabuses have been written to include as much explanatory material as possible.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Form 4 syllabus now completed.

S. PLANS FOR THE FUTURE: Revision of Forms 1-4 syllabuses, based on the five years of teaching so far.

*Response made for 1966 Report.

A. PROJECT TITLE: EDUCATION DEPARTMENT OF WESTERN AUSTRALIA EXPERIMENTAL SECONDARY SCHOOL MATHEMATICS (YEARS 1-3)

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: J. R. Greenway, 1961.

C. PROJECT DIRECTOR: J. R. Greenway.

D. PROJECT HEADQUARTERS ADDRESS: Curriculum and Research Branch, Education Department, 45 Havelock Street, West Perth, Western Australia.

E. PROFESSIONAL STAFF: Present: B. Lawrence, I. Froyland, D. Andrich, and M. Macdonald, Research Officers; Past: N. Hoffman and J. Harbisher, Senior Masters; R. Mortlock, Research Officer; K. Nener, Master.

F. PROJECT SUPPORT: Education Department.

G. SPECIFIC PURPOSES AND OBJECTIVES: To develop modern programmes in mathematics for Years 1-3 in High schools; to write textbooks for these programmes for 3 levels of student ability - advanced, ordinary and elementary.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Arithmetic and Algebra; Geometry and Trigonometry, each for Years 1 - 3.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. Syllabuses in Arithmetic, Algebra, Geometry, and Trigonometry for Years 1 - 3.

Textbooks:

2. Introductory Mathematics Year I.
3. Fractions Year I.
4. Decimals Year I.
5. Ratio and Proportion Year I.
6. Statistics Year III.
7. Sentences and Truth Sets Year I.
8. The Arithmetic Numbers Year I.
9. The Real Numbers Year I.
10. Addition of Real Numbers Year II.
11. Multiplication of Real Numbers Year II.
12. Subtraction and Division Year II.
13. Open Sentences Year II.
14. Open Sentences in Two Variables Year II.
15. Geometry Introductory I - Year I.
16. Geometry Introductory II - Year I.
17. Geometry Introductory II - Year I.
18. Geometry Advanced I - Year II.
19. Geometry Ordinary I - Year II.

Material prepared in sheet form includes:

20. Measurement and Mensuration Year II.
21. Applications to Commerce Year II.
22. Factors Year III.
23. Geometry Advanced 2 - Year III.
24. Geometry Ordinary 2 - Year III.

J. USE OF PROJECT MATERIALS: Approximately 120 teachers are using the above-mentioned programmes. 11 government and 5 non-government high schools are involved. All 16 schools have first year students on the programmes, 7 also have second year students on the programmes, and 1 (Mt. Lawley S. H. S.) has 3rd year students involved.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: Texts:

25. Measurement and Mensuration Year II.
26. Applications to Commerce Year III.
27. Factors Year III.
28. Relations and Fractions Year III.
29. Elementary Geometry Years II and III.

N. MATERIALS AVAILABLE FREE:

1. Single copies of each syllabus. Write to Curriculum and Research Branch, Education Department, 45 Havelock Street, West Perth, Australia.

2 - 19. Single copies of each of texts produced.

20 - 24. All loose sheet printed matter.

O. MATERIALS PURCHASABLE: All texts are purchased by students, but not loose sheets. No materials may be purchased without permission of project director.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Syllabuses have been constantly under review by a Committee of teachers representative of all secondary schools. Modifications are often made on the basis of teachers subjective feedback. Several achievement tests in basic computational processes have been developed and given in schools to enable comparisons to be made between the old and new courses.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The Education Department has for the past several years organized fortnightly or weekly inservice courses each year.

R. PLANS FOR THE FUTURE: Revision of some texts produced; provision of materials for the ordinary and elementary levels as well as the advanced; extended use of the above programmes throughout the State.

A. PROJECT TITLE: INDIVIDUAL MATHEMATICS PROGRAMME

B. PROJECT DIRECTOR: M. L. Clark, Assistant to the Director, Australian Council for Educational Research, 9 Frederick Street, Hawthorn E. 2, Victoria, Australia. Tel: 81.1271-2-3.

C. PROJECT HEADQUARTERS:
a. Address: Same as B; Contact The Advisory Services Officer.
b. Facilities available for viewing: Permanent display at the project headquarters. Visitors should contact the Advisory Services Officer. Review sets available on loan (within Australia).

D. PRINCIPAL PROFESSIONAL STAFF: John F. Izard, Executive Officer; Kathleen S. Wright, Research Assistant; Author panel comprising: John F. Izard, Don H. Goodger, Frank L. Smith, Graham J. Whitehead, Beth M. Blackall. Consultants: S. S. Dunn, Professor of Education, Monash University; J. P. Keeves, Senior Research Officer, A.C.E.R.; and Curriculum and Research Officers of all Australian State Education Departments.

E. PROJECT SUPPORT: Australian Council for Educational Research, and State Education Departments.

F. PROJECT HISTORY:
a. Principal originator: Australian Council for Educational Research.
b. Date and place of initiation: December, 1964; Melbourne, Victoria, Australia.
c. Reason for initiation: To provide individual teaching materials to suit new mathematics curricula being implemented in all Australian States.

G. PRESENT COMMERCIAL AFFILIATIONS: Set B for Grades 3 and 4 has been published by Rigby Limited, Adelaide, South Australia.

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop text and assignment materials which permit individual progress through a modern mathematics program, based upon the outline of content which resulted from the Curriculum Officers' Conference at A.C.E.R., March 1964. All Australian States have courses of study bearing a close correspondence with this outline of content.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Elementary School Mathematics: Set A (Grades 1 & 2 approx.); Set B (Grades 3 & 4 approx.); and Set C (Grades 5 & 6 approx.). One kit of materials is intended for a class of up to 40 children.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Set B for Grades 3 and 4 comprising: Placement Test, Number Booklets and Answer Cards, Worksheet Pads, Mastery Test Pads, Assignment Cards and Answer Cards, Record Charts, Transparent Grids, Plastic Building Pegs, Gummed Paper Shapes, Clockface Stamp, Glue, Colored Pencils, Teachers' Handbook.
2. Information Bulletin.
3. Brochure.
4. Review set comprising sample items from No. 1 above.

K. **MATERIALS AVAILABLE FREE:** Nos. 2 and 3 above from Australian Council for Educational Research.

L. **MATERIALS PURCHASABLE:** No. 1 above, $60 (Australian currency) nett. per set, available from Australian Council for Educational Research or from the publishers - Rigby Limited, Adelaide, South Australia. Cost does not include freight (45 lb. wt.); No. 4 above, $5 (Australian currency) nett. per set, available from Australian Council for Educational Research only. Cost does not include freight (1-1/4 lb. wt.).

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** None listed.

O. **USE OF PROJECT MATERIALS:**

a. Number of teachers using Set B materials: Cannot be determined. Over 2,000 copies of Set B have been purchased.

b. Number of teachers using Set C draft materials: Ten teachers are undertaking trial of materials in schools listed below.

c. Some specific schools where Set C draft materials are being tried: Tullamarine State School; Parklands State School; Essendon Grammar School; St. Albans East State School.

P. **MATERIALS PRESENTLY BEING DEVELOPED:** 5. Set C for Grades 5 and 6.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** (In addition to State Education Department Programs.) Format of training program: One-day Seminar comprising lecture, workshop groups, and question-time. Nature of content: Discussion of new mathematics curricula; discussion of materials of Set B; groups work through the scheme. Places where offered: Dependent upon demand.

R. **PROJECT EVALUATION:** In 1966 a follow-up study of Set B was commenced in three Victorian Schools. In each school there were two comparable heterogeneous grades at Grade 3 level and two comparable heterogeneous grades at Grade 4 level. Class size was 35+ and teachers were of comparable experience, education, and seniority. The class from each pair to use the scheme was decided by random assignment; the remaining class followed a conventional approach as a control group. Each class was visited about once every two weeks to observe teaching in both control and experimental classes. Reports on the effectiveness of the materials were made by participating teachers. Specially constructed tests of achievement in computation, mathematical knowledge and understanding, and verbal problem solving were administered as pre-tests. Parallel forms of these tests were used for post-tests administered five months later. One of the tests from the Victorian Primary Schools Testing Programme was also administered as a post-test. An attitude questionnaire was administered to all classes before and after the experimental period. Results indicated that students using Set B made similar gains in learning as students in control classes. Experimental classes showed greater interest in mathematics and indicated a preference for more varied approaches to mathematics problems.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: In July 1966 State Curriculum Officers met at the A.C.E.R. Office to prepare a statement of objectives for Kit C (Grades 5 and 6). Some materials were prepared and given preliminary trial in a small number of classrooms. Reports on the effectiveness of the materials were made by participating teachers. A revised version is now under trial in a larger number of classrooms.

T. PLANS FOR THE FUTURE: Investigation of feasibility of Kit A for Grades 1 and 2; Preparation of second edition of Kit B; Publication of Advisory Service Bulletins.

A. PROJECT TITLE: JUNIOR SECONDARY SCIENCE PROJECT (JSSP)

B. PROJECT DIRECTORS: J. S. Turner, University of Melbourne, Chairman of the Science Standing Committee of the Victorian Universities and Schools Examinations Board; W. C. Radford, Director of the Australian Council for Educational Research.

C. PROJECT HEADQUARTERS:
a. Address: Junior Secondary Science Project, Australian Council for Educational Research, Frederick Street, Hawthorn, E. 2, Victoria, Australia. Contact L. G. Dale, Executive Officer.
b. Facilities available for viewing: Examination of materials produced and in production; discussions with professional staff; visits to classes conducting trials of materials.

D. PRINCIPAL PROFESSIONAL STAFF: L. G. Dale, Executive Officer; Writers: M. B. Wilkinson; M. Beaumont; M. Robinson; A. Thomas.

E. PROJECT SUPPORT:
a. Organizational sponsorships: Victorian Universities and Schools Examinations Board; Australian Council for Educational Research.
b. Funding agencies: Ian Potter Foundation; Percy Baxter Charitable Trust; Victorian Department of Education; Broken Hill Proprietary Co. Ltd.; Electrolytic Zinc Co. of Australia Ltd.; Imperial Chemical Industries of Australia and New Zealand Ltd.

F. PROJECT HISTORY:
a. Principal originator: The Science Standing Committee of the Victorian Universities and Schools Examination Board, in conjunction with the Australian Council for Educational Research.
b. Date and place of initiation: February, 1966; Hawthorn, Victoria.
c. Reason for initiation: To provide science learning materials for use in the first four years (Grades 7-10) of Victorian secondary schools.

G. PRESENT COMMERCIAL AFFILIATIONS: None. Negotiations are currently in progress to determine a publisher for publication of the first general edition.

H. PURPOSES AND SPECIFIC OBJECTIVES: The learning materials consist of card systems with accompanying teacher's guides, designed to enable individual rate of student progress; laboratory experimentation as an integral part of the learning sequence; facility for modification or supplementation of the material by teachers or project writers.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Science, embracing aspects of chemistry, physics, biology, astronomy and geology; Grade 7 (Form 1) to Grade 10 (Form 4); ages 12-15 years.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: The work for each year is divided into units. Each unit consists of a card sequence with optional and remedial branches, terminating in a comprehensive test. A teacher's guide folder accompanies each unit. Each unit is to be tried in the classroom, revised, re-tried and revised a second time prior to the publication of the first general edition. Five Form 1 units have been written ready for the second classroom trial.

1. Unit 1: Introduction. An introduction, in card form, to the use of the card learning sequence, with some introduction to the nature of science and to common laboratory equipment.
2. Unit 2: The Sky Throughout the Year. Observation of the sun, moon and southern stars and specification of position by measurement of elevation and azimuth. Some interpretation of the data obtained.
3. Unit 3: Materials of the Universe. This unit leads students through activities with solids, liquids and gases to a particle model of matter.
4. Unit 4: When Substances are Mixed. An introduction to chemical change through the study of certain non-reacting mixtures, solutions and reacting mixtures.
5. Unit 9: Places and Things. A study of a biological community to bring out some of the factors determining its structure and some factors influencing changes that may take place.

Two Form 1 units have been prepared for the first classroom trial.

6. Unit 6: Energy for Life. An examination of the products of respiration leading to the idea of the release of energy from food during respiration in living things.
7. Unit 8: Food for Living Things. An historical account of the discovery of the role of photosynthesis and a brief comparison between animal and plant modes of nutrition.

K. MATERIALS AVAILABLE FREE: A limited number of teacher's guide folders, which incorporate one of each of the cards and worksheets used in the classroom, for each unit so far produced. Requests should be made to the project executive officer.

L. MATERIALS PURCHASABLE: A limited number of teacher's guide folders for each of the units so far produced. Each folder costs $1 (Aust.) plus postage. Requests should be addressed to the Sales Division, Australian Council for Educational Research, Frederick Street, Hawthorn, E. 2, Victoria, Australia. Payment should accompany all orders.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 10 in closely supervised trial classes, 15 others in other Australian states.

b. Some specific schools where course is being taught: Methodist Ladies' College, Glenferrie and Barkers Roads, Kew, Victoria; Bentleigh High School, Margaretta Street, East Bentleigh, Victoria; Carey Baptist Grammar School, 349 Barkers Road, Kew, Victoria.

P. MATERIALS PRESENTLY BEING DEVELOPED: Two further units are in preparation for Form 1 classes.

8. Unit 5: When Substances are Heated. An experimental investigation of some effects of heating.

9. Unit 7: The Changing Earth. An introduction to geology.

The preparation of materials for Form 2 classes will commence in February, 1967.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: No plans have yet been finalized.

R. PROJECT EVALUATION:

a. Instruments used: An evaluation panel comprising five test-constructors has produced a comprehensive test for each unit so far prepared.

b. Control groups: There has been no attempt to compare the effectiveness of JSSP learning procedures with that of any other learning procedure.

c. Feedback process: Teachers provide detailed comments in special evaluation folders on all materials tried in the classroom; students complete evaluation questionnaires on completion of each unit; student workbooks and test results are analysed in detail; writers visit regularly each trial class, and monthly meetings of trial class teachers are held.

d. Behavioral objectives identified: An attempt has been made to identify specific behavioral objectives for each unit. A classification of these objectives has been constructed.

e. Research evidence of objectives achieved: Analysis of comprehensive test results indicate good progress towards the achievement of specific cognitive objectives.

f. Other pertinent information: Difficulty has been encountered in the attempt made to construct a satisfactory instrument for evaluation of affective objectives. This matter is being given further consideration.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Most of the Form 1 materials have been prepared. During 1967, Form 2 materials will be prepared. The 1966 evaluation showed the approach adopted to be feasible. A more intensive evaluation will be carried out during 1967.

T. PLANS FOR THE FUTURE: During 1967 commercial publication of the first general edition will begin. Sufficient units should be available to permit general use of materials in Form 1 from February, 1968.

During 1968, Form 2 materials will be published and Form 3 materials will be prepared.

During 1969, Form 3 materials will be published and Form 4 materials will be prepared. The project will enter its second phase in 1970 with the completion of the initial production of materials and the commencement of the first general revision.

A. PROJECT TITLE: VICTORIAN MATRICULATION CHEMISTRY*

B. PRINCIPAL ORIGINATOR: A. S. Buchanan, Head, Department of Chemistry, University of Melbourne.

C. PROJECT DIRECTOR: A. S. Buchanan.

D. PROJECT HEADQUARTERS ADDRESS: Chemistry Department, University of Melbourne, Australia.

E. PROFESSIONAL STAFF: D. R. Stranks, Professor of Inorganic Chemistry, University of Adelaide; P. T. McTigue, Senior Lecturer in Physical Chemistry, University of Melbourne; K. C. LeeDow, Lecturer in Chemistry, Secondary Teachers' College, Melbourne; G. R. A. Withers, Senior Chemistry Master, Melbourne Church of England Grammar School; M. L. Heffernan, Senior Lecturer in Chemistry, Monash University. The working group, drawn from universities, schools, and teacher training institutions worked full time for one year on the project. They were paid their normal salaries by sponsoring groups and institutions. They received no royalties from sales of materials, this finance going to further development of chemistry teaching, and to partially subsidize materials to enable high quality textbook production at moderate cost.

F. PROJECT SUPPORT:
a. Organizational sponsorship: University of Melbourne.
b. Funding agencies: Thomas Baker (Kodak); Alice Baker and Eleanor Shaw benefactions, together with contributions from the Royal Australian Chemical Institute, and eight Australian industrial companies.

G. SPECIFIC PURPOSES AND OBJECTIVES: Thorough revision and reappraisal of curriculum of final year school chemistry; preparation of a student text and of a student practical manual for the new course; preparation of materials for teachers for the course; development of suitable examination papers.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Matriculation (final year of secondary school) chemistry in Victoria (corresponds roughly to first year college chemistry in many U. S. institutions).

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: 1. Textbook: Stranks et al., Chemistry - A Structural View (Melbourne Univ. Press 1965); in England: Cambridge Univ. Press; in Canada: Macmillan. 2. Practical Manual: Withers, Practical Manual to accompany above text (Melbourne Univ. Press 1965). 3. Teaching Notes: LeeDow et al., Teaching Notes to accompany both the above. 4. Syllabus of the course, and notes on the scope and method of treatment.

J. USE OF PROJECT MATERIALS: Over 300 teachers are using the complete program, and about 100 teachers are using portions of it. The above figures are for Victoria only. The books are prescribed for first year chemistry at the University of Sydney in New South Wales and are being used in New Zealand and Scotland. Some specific schools where material is being used: all Victorian secondary schools.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Possibly German and Spanish.

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED:
5. Trial examination papers.

N. MATERIALS AVAILABLE FREE: Items 4 and 5 above, from the Victorian Universities and Schools Examinations Board, 437 St. Kilda Road, Melbourne, Victoria, Australia.

O. MATERIALS PURCHASABLE: Items 1, 2, and 3 from publishers indicated in J. Textbook: $6.00 (Aust.); Practical Manual: $1.75 (Aust.); Teaching Notes: $2.00 (Aust.).

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Continual appraisal of progress in schools through a Standing Committee in Chemistry, of the Victorian Universities and Schools Examination Board.

Q. SPECIFIC PLANS FOR TEACHER EDUCATION: In-service courses for teachers have been held in Melbourne and in a number of Victorian country centers.

R. PROJECT ACTIVITIES SINCE 1965 REPORT: Not previously reported.

S. PLANS FOR THE FUTURE: Further and more extensive courses of teacher preparation; and revision of syllabus and teaching materials within three years.

*Response made to 1966 Report.

A. PROJECT TITLE: CENTRO DE ENSINO DE CIÊNCIAS DA BAHIA - CECIBA (SCIENCE TEACHING CENTER OF BAHIA)*

B. PRINCIPAL ORIGINATORS: University of Bahia, The Government of the State, and Ministery of Education

C. PROJECT DIRECTOR: José Walter Bautista Vidal

D. PROJECT HEADQUARTERS ADDRESS: Rua Aristides Novis, 2, Escola Politecnica, 8° andar, Salvador, Bahia, Brasil

E. PROFESSIONAL STAFF: Martha Maria de Souza Dantas, Mathematics Coordinator; Antonio Celso Sprinola, Chemistry Coordinator; Luiz Filipe Perret Serpa, Physics Coordinator; Julieta Fahel Guimarães, Biology Coordinator

F. PROJECT SUPPORT: Ministery of Education, University of Bahia and State Government

G. SPECIFIC PURPOSES AND OBJECTIVES: Intensive Training Courses (winter and summer vacations); Special courses about specific subjects; Research on higher levels for national and foreign professors; Educational radio and T. V.; Science Fairs; Production of scientific material; Publications, Seminars, etc.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Our projects pertain to high school level.

MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. Tests
2. Books
3. Summary of the intensive courses

J. USE OF PROJECT MATERIALS: 20 teachers are using the complete program and 15 others are using some of the materials. Specific schools where materials are used: Colégio Estadual de Bahia (State College); Colégio Estadual Severino Vieira, Colégio dos Maristas.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Portuguese

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: Equipment for Laboratories.

N. MATERIALS AVAILABLE FREE: Nos. 1, 2 and 3

O. MATERIALS PURCHASABLE: None described

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Asking teachers and student's opinions, through questionnaires and interview with selected students and teachers, and with the help of statistical analysis.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Intensive courses - 10 days approximately; 5 weeks courses during summer and winter vacations; States of Bahia (Capital and Interior), Sergipe and North of Minas Gerais.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Not previously reported.

S. PLANS FOR THE FUTURE: Continuation of each of the activities listed in question G.

The Science Teaching Center of Bahia is but one of several new centers established for the purpose of improving science education in Brazil. Similar activities are in progress at each of the centers. Persons desiring further information may contact them directly at the following addresses:

1. Centro do Ensino de Ciências do Nordeste (CECINE), Diretor Executivo: Professor Marcionilo Lins; Cidade Universitária - Engenho do Meio; Caixo Postal 2047
2. Centro de Treinamento de Professôres de Ciências de Minas Gerais (CECIMIG); Diretor Executivo: Professor Jenner Procópio de Alvarenga; Rua Carangola, 288 - 5° andar - sala 518; Caixa Postal 253
3. Centro de Treinamento de Professôres de Ciências da Guanabara (CECIGUA); Diretor Executivo: Professor Ayrton Gonçalves da Silva; Colégio Estadual João Alfredo; Av. 28 de Setembro, 109; Rio de Janeiro - GUANABARA (ZC-11), Brazil
4. Centro de Treinamento de Professôres de Ciências de Sao Paulo - (CECISP); Diretor Executivo: Professor Myriam Krasilchik; Caixa Postal 2921; São Paulo - SÃO PAULO, Brazil
5. Centro de Treinamento para Professôres de Ciências do Rio Grande do Sul (CECIRS); Diretor Executivo: Professor Luiz Settinero; Colégio Estadual Júlio de Castilhos; Av. João Pessoa - Praca Piratini s/n; Porto Alegro - RIO GRANDE DO SUL, Brazil

*Response made for 1966 Report.

A. PROJECT TITLE: FUNDAÇÃO BRASILEIRA PARA O DESENVOLVIMENTO DO ENSIMO DE CIENCIAS - BRAZILIAN FOUNDATION FOR THE DEVELOPMENT OF SCIENCE TEACHING(FORMER IBECC-S. PAULO)

B. PROJECT DIRECTOR: Isaias Raw, Scientific Director

C. PROJECT HEADQUARTERS:
a. Address: Box 2921, S. Paulo, Brazil, Contact: Isaias Raw
b. Facilities available for viewing: Equipment production center, new materials development, training center.

D. PRINCIPAL PROFESSIONAL STAFF: Miriam Krasilchik, teachers training, Head of Biology; Antonio Teixeira, Head of Physics; Ernestro Giesbrecht, Head of Chemistry; Rahil Gebrara, Head of General Sciences; Nabor Rueg, Head of Earth Sciences; Julieta Ormastroni, Executive Director; Lidia Lamparelli, Head of Mathematics.

E. PROJECT SUPPORT:
a. Organizational sponsorships: A self-supported Foundation
b. Funding agencies: Funds come from grants, editorial activities and production of low cost equipment for experimental sciences.

F. PROJECT HISTORY:
a. Principal originators: Isaias Raw, M. J. Ormastroni, J. Cavalcanti and P. M. da Rocha
b. Date and place of initiation: 1952; S. Paulo
c. Reason for initiation: Improvement of secondary school science education with emphasis on experimentation and discovery by the students.

G. PRESENT COMMERCIAL AFFILIATIONS: None. The Foundation makes contracts with publishers to publish and distribute books and publications.

H. PURPOSES AND SPECIFIC OBJECTIVES: The Foundation puts its emphasis on re-evaluation of science education, by active scientists, that persuade the school system, from the primary school to the University to use new ideas, continuously developed. Emphasis on experimentation in the school with low cost materials, or at home with small low cost kits. Generate new materials, units and equipment and at the same time has introduced several of the NSF projects (PSSC, ESCP, BSCS, SMSG, CBA, CHEMS, IPS).

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: General sciences for primary school; General sciences for junior high school; Physics, Chemistry, Biology and Mathematics for senior high school; Mathematics for primary school and junior high school; Earth Sciences for senior high school; Experimental Psychology, biochemistry, physiology and physics for College.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Adaptations of BSCS blue and green version; Geosciences
2. Units in Chemistry, Physics and Biology
3. Units in General Sciences for primary school
4. General Science for junior high school
5. Translation with adapted teachers guides in SMSG,CBA,PSSC,CHEMS

K. MATERIALS AVAILABLE FREE: Books and models of kits. A few now available in Spanish, but most only in Portuguese.

L. MATERIALS PURCHASABLE: Kits and equipment for the different curricula, at our cost. The Foundation assists non-profit organizations in local production of science equipment.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Portuguese

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Spanish (kits, General Science; English (An Indian adaptation of General Science)

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: About 6,000
  b. Some specific schools where course is being taught: About 70% of the Brasilian secondary school system

P. MATERIALS PRESENTLY BEING DEVELOPED:
  6. Psychology, an experimental course
  7. Physiological sciences
  8. Units of elementary science related to public health and agronomical national problems
  9. Block for College biology
  10. New general science based on conservation (matter, energy, species and human cultural heritage)

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Through six centers, originated by this activity (the first planned by this group for Northeast is Cecine; one in this area, closely connected to our Foundation and using same staff and facilities is CECISP), large variety of teachers training activities are developed. Includes Summer institutes, in-service, seminars, small courses, conferences, national conferences, six-month fellowships in our institution. Over one thousand will be trained this year only in Cescisp.

R. PROJECT EVALUATION:
  a. Instruments used: Feedback information. Use of College entrance board examinations (under a separate foundation Fundação Carlos Chagas, closely connected to this Foundation)
  b. Control groups: Yes
  c. Feedback process: Some of our staff conduct classes at regular schools. Teachers trained in Summer institute, work to prepare teachers guides and introduce changes in new editions of texts and on the equipment.
  d. Behavioral objectives to be evaluated: None described
  e. Research evidence of objectives achieved: A large change of the attitude towards science teaching, acceptance of student experimentation that did not exist, large demands for books and equipment.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: An English report reviewing the last 16 years of activities is now in press and provides full details on the overall operation.

A. PROJECT TITLE: ALBERTA ELEMENTARY SCIENCE PROJECT

B. PROJECT DIRECTOR: Professor Neil M. Purvis, Department of Elementary Education, Faculty of Education, University of Alberta, Edmonton, Alberta, Canada

C. PROJECT HEADQUARTERS:
  a. Address: Same as "B" above.
  b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Neil M. Purvis, Associate Professor

E. PROJECT SUPPORT:
  a. Organizational sponsorship: Department of Elementary Education, Faculty of Education, U. of A.
  b. Funding agency: Alberta Advisory Council on Educational Research

F. PROJECT HISTORY:
  a. Principal originators: Neil M. Purvis; Dr. J. W. G. Ivany
  b. Date and place of initiation: Fall 1966; In selected schools of Alberta
  c. Reason for initiation: To test new materials in science in various types of classrooms

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The main objective of this project is to develop guidelines for science programs for elementary school children for the seventies.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Science Grade K-6

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: None except the Annual Report

K. MATERIALS AVAILABLE FREE: Annual Report, 1966

L. MATERIALS PURCHASABLE: Some planned for the fall of 1967.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGE INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: English

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: 145
  b. Some specific schools where course is being taught: Calgary Public School Board; Edmonton Public School Board

P. MATERIALS PRESENTLY BEING DEVELOPED: A guide to the use of local resources in teaching science in elementary grades.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None

R. PROJECT EVALUATION:
  a. Instruments used: Being developed
  b. Control groups: None described
  c. Feedback process: Questionnaires are completed and returned for completion. The director interviews teachers in project schools.

d. Behavioral objectives identified: None described

e. Research evidence of objectives achieved: None described

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Contained in the Annual Report.

T. PLANS FOR THE FUTURE: Writing to be done during summer of 1967; Publication - late fall.

A. PROJECT TITLE: NATURAL SCIENCE PROGRAM IN GENERAL EDUCATION

B. PROJECT DIRECTOR: C. Brian Cragg, Coordinator.

C. PROJECT HEADQUARTERS: York University, 4000 Keele Street, Toronto, Ontario, Canada. Contact Mr. Cragg.

D. PRINCIPAL PROFESSIONAL STAFF: C. Brian Cragg, Coordinator; Fred H. Knelman, Panjar Rajagopal, Associate Professors; Michael G. Boyer, Brian Colman, Robert Snow, Chester M. Sadowski, Assistant Professors; Ian A. Brookes, Lecturer; 10 Instructors, Senior Demonstrators, and Demonstrators.

E. PROJECT SUPPORT:
  a. Organizational sponsorship: York University.
  b. Funding agencies: Federal and Ontario Provincial Government.

F. PROJECT HISTORY:
  a. Principal originator: None described.
  b. Date and place of initiation: September, 1963; York University.
  c. Reason for initiation: None described.

G. PRESENT COMMERCIAL AFFILIATIONS: None described.

H. PURPOSES AND SPECIFIC OBJECTIVES: To establish and offer curricula in science for non-science majors at York University day and evening programs. The curricula are established to meet a variety of interests and high school preparations.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: All courses at present, in the day program, are suitable for freshmen. If a student elects a second of these courses he or she takes it as a sophomore. In the evening college they form part of the required interdisciplinary core required of all students before proceeding to major courses.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
  1. Revision of Nature and Growth of the Physical Sciences.
  2. Course outline and ancillary notes for The Nature and Growth of the Physical Sciences.
  3. Course outline for Principles of the Physical Sciences.

K. MATERIALS AVAILABLE FREE: Item No. 2.

L. MATERIALS PURCHASABLE: Item No. 3 - $2.50.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: 16
  b. Some specific schools where course is being taught: York University.

P. MATERIALS PRESENTLY BEING DEVELOPED: Course outlines as follows:

4. "Exploration of the Universe."
5. "The Intellectual and Social Milieu of Modern Science."
6. "The Nature of the Natural Sciences."
7. "Science, Technology, and Society."
8. "Evolution."
9. "Geophysics and Astronomy."

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Used in evening program (and the connected summer school) in classes containing many teachers, particularly those in elementary school.

R. PROJECT EVALUATION: Student questionnaires are reasonably favorable.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Revision of course outlines and extensive research on laboratory and demonstration co-lateral work.

T. PLANS FOR THE FUTURE: Summer work on curricula and laboratory/ demonstration work by our team.

A. PROJECT TITLE: PROJECT MATHEMATIQUE DE SHERBROOKE, UNIVERSITE DE SHERBROOKE

B. PROJECT DIRECTOR: Zoltan P. Dienes, 1382 rue Dominion, Sherbrooke, Province de Quebec, Canada, Tel. 819-569-8446

C. PROJECT HEADQUARTERS:
a. Address: Universite de Sherbrooke, Sherbrooke, P.Q. Canada, Tel. 819-569-7431, X356, Contact: Project Director
Facilities for viewing: Project classes can be visited on Mondays or on Tuesday Afternoons. Work in theelectronic learning laboratory any time by appointment.

D. PRINCIPAL PROFESSIONAL STAFF: Zoltan P. Dienes, Director; Claude Gaulin, Teacher Training; Helene Kayler, Teacher training; Bela Parkanyi, Electronic laboratory; Soeur Dominique, Professeur du cours pre-classique.

E. PROJECT SUPPORT: University of Sherbrooke, Conseil des Arts du Canada (Canada Council), Provincial Government of Quebec, International Study Group for mathematics learning

F. PROJECT HISTORY:
a. Principal originators: Zoltan P. Dienes and Soeur Renee du Saint Sacrement
b. Date and place of initiation: January 1965; Ecole Normale du Sacre Coeur, Sherbrooke
c. Reason for initiation: The eventual revision of mathematics instruction in the Sherbrooke public school system, with a view to a general province-wide revision, in the light of the most modern available knowledge, in pursuance of the principles laid down by the Rapport Parent, prepared by the Quebec Government.

G. PRESENT COMMERCIAL AFFILIATIONS: Office Central des Librairies, 65 rue Claude Bernard, Paris, 5; Educational Supply Association, Pinnacles, Harlow, Essex, G.B.; Herder and Herfer, 232 Madison Avenue, N. Y., Education Nouvelle, Montreal.

H. PURPOSES AND SPECIFIC OBJECTIVES: Objectives under F. One unique characteristic is that the laboratory work goes on hand in hand with the classroom work, that it is internationally oriented, being in close touch with at least six other projects in places such as New Guinea, South Australia, England, France, Hungary, Germany, etc. The latest available knowledge on how children learn, as well as of the structure of the foundations of mathematics, are made use of in the planning of the curriculum and of the methodology. Concrete experiences in varied situations are emphasized from the start, the learning of logic is started as soon as the child comes to school (from concrete games), and the cycles: free play, structures but varied play, abstraction, representation of abstraction, reflection on representation, axiomatization are carefully mapped out.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Logic, Sets, Relations (order, equivalence, difference, etc.), leading to cardinals and ordinals and their synthesis, counting by grouping in arbitrary bases, relations leading to functions, e.g., adding, subtracting color-changing, reflecting, rotating, etc., study of states and operators in general, proceed to study of relations between operators in general (commutative, associative, distributive laws appear as particular cases), arithmetical algorithms (all this from 6 to 9 years).

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Logical blocks (attribute blocks)
    a. using colors and shapes
    b. using human figures
2. Multibase arithmetic blocks
    a. rectangular sets in bases 2, 3, 4, 5, 6 and 10
    b. triangular and trapezoidal sets in bases 3 and 4
3. Algebra kit, for use with algebra of natural number as well as for integers, including vector spaces, complex numbers, scalar products and matrices (between 4th and 6th grades)
4. Geometry kit, for use with Geometry of transformations (not yet available commercially)
5. Practical measurement kit, for use with exploration of Space and Practical Measurement. (not yet available commercially)
6. Books
    a. Modern Mathematics for young children, Z. P. Dienes
    b. First years in Mathematics, Z. P. Dienes and W. W. Golding; I. Logic, II. Sets, numbers and powers, III. Exploration of Space and Practical Measurement
    c. Geometry through Transformations, Z. P. Dienes, E. W. Golding; I. Geometry of Distortion, II. Euclidean Geometry, III. Groups and Coordinates
    d. Fraction, Z. P. Dienes
    e. Introduction to algebra, Z. P. Dienes (includes instructions for the use of the algebra kit) I. Relations, attribute operators, geometrical operators and multiplying operators, II. Mixes Operators (Distributive law), including study of elementary rings, III. Linear Equations and Quadratics, IV. Linear Algebra. Introduction to integers, vector spaces, scalar products, complex numbers and matrices (all starting from concrete experiences by each child)
    f. Powers, roots and logarithms, Z. P. Dienes

    All the above form part of the program. They include teachers notes and children's instruction cards. They are or will be available from organizations cited under "G".

    g. L'apprentissage de la logique, O.C.D.L. (see G) Z. P. Dienes
    h. Building up Mathematics, Hutchinson, London, by Z. P. Dienes
    i. An experimental study of mathematics learning, Hutchinson, London, by Dienes and Jeeves
    j. Power of Mathematics, Hutchinson, London, by Z. P. Dienes
    k. Thinking in Structures (with M. A. Jeeves), Hutchinson, London, by Dienes and Jeeves
    l. Mathematics in the Primary School, MacMillan, LONDON by Z. P. Dienes

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: Where not indicated under J, please refer to G. Otherwise refer to publishers indicated under J.

Most rapid delivery is probably through Education Nouvelle, 306 Est Rue Sherbrooke, Montreal, QUE, Canada. All deliveries are slow, owing to heavy demands. Please order as early as possible.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Mostly English. Majority of materials are available in English and French.

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: English, French, Italian, German, Spanish, Portuguese, Dutch.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Unknown

b. Some specific schools where course is being taught: Ecole Eymanrd, Ecole Sainte Famille, College Sacre Coeur (all Sherbrooke) Ecole Decroly Saint Mande (Paris), Ecole Alsacienne (Paris), probably about a thousand schools or more in Great Britain, P.S. 41 New York City, Downtown Community School, N.Y.C., New Canaan School (CONN), Cowandilla School, S. A. Australia and many others in S. A. as well as in New Guinea and the Philippines) etc.

P. MATERIALS PRESENTLY BEING DEVELOPED: Complete revision of the present arithmetic sequences (M.A.B.), the study of axiom systems through dihedral and polyhedral groups, the study of the learning of logic (transition from concrete logical - type experiences to formal reasoning), the role of relations in early learning, etc.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Teachers are taught by bringing them into contact with the live learning situation from the start. Learning situations with real children are observed, then a short explanation by the trainer is followed by discussion. This is followed by putting the trainees into unusual learning situations, to make them feel what the process is like which they will help their charges to go through. Content as under I, and more, as indicated by titles of books under J. The training is offered in Sherbrooke, Montreal, Adelaide, New Guinea, Paris, Leicestershire (England).

R. PROJECT EVALUATION:

a. So far only standard local achievement tests have been used. In no cases have results been lower than the local average, in most cases above.

b. Control Groups: No specific controls. With the radical departure from usual curriculum and methods, control groups would make no sense.

c. Feedback process: We encourage users all over the world to provide us with criticism of the way in which the situations are set up. This is done by correspondence or by international gatherings. Several revisions have already taken place as a result.

d. Behavioral objectives identified: The recognition of abstract mathematical structures in real situations, ability to recognize a structure embedded isomorphically in another, ability to generalize a structure, greater ease of learning when new subjects are introduced than would normally be the case, etc.

e. Research evidence of objectives achieved: Research described in "Thinking in Structures", to be followed by an even more radical follow-up, just completed, has so far vindicated the principles on which learning sequences are planned. So far project children have scored much higher scores on structural tasks than children from "normal" school backgrounds.

f. Other pertinent information: All the above must be considered in an international context. The present project was not a "start from scratch", but the results of the Leicestershire, Adelaide and New Guinea Projects, were available at the start. The project continues to be a part of this international effort.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported

T. PLANS FOR THE FUTURE: Mr. Golding is coming over from Adelaide to put together a teacher training book for teachers colleges of a general kind, incorporating the spirit if not all the detail of the work described. This will take place January-February 1967. in Sherbrooke. Z. P. Dienes is planning to spend part of June, July and August in New Guinea, South Australia and possibly the Philippines, to help clinch matters in these three areas. The whole program is intended to be published during the course of 1967. For details please refer to Educational Supply Association, London.

A. PROJECT TITLE: BIOLOGY CURRICULUM DEVELOPMENT PROJECT

B. PROJECT DIRECTOR: B. J. P. Alles, Deputy Director General, Secondary Education Branch, Ministry of Education, Malay St., Colombo 2, Ceylon. Tel: 79552.

C. PROJECT HEADQUARTERS:
   a. Address: Education Research, Secondary Education, Ministry of Education, Colombo - 2, Ceylon. Contact D. Weerasinghe.
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: D. Weerasinghe, Lecturer, Science Training College, Ministry of Education; A. Subasinghe, Lecturer, Science Training College, Ministry of Education.

E. PROJECT SUPPORT:
   a. Organizational sponsorships: The Ministry of Education, Government of Ceylon.
   b. Funding agencies: The Ministry of Education, UNESCO; UNICEF; CREDO; Asia Foundation.

F. PROJECT HISTORY:
   a. Principal originator: The Ministry of Education.
   b. Date and place of initiation: 1961; Colombo, Ceylon.
   c. Reason for initiation: No systematic revision of biology curricula for a considerable period; to gear the curricula to local environment; recognition of a major change in the pupil population (95% non-university stream).

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Does not apply.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Biology, Grades 9 and 10; age levels - 14-15 +.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Revised syllabus.
   2. Detailed Schemes of Work.
   3. Detailed list of apparatus.
   4. Pupil Text, Vol. I - Grades 9, 10.
   5. Evaluation materials.

K. MATERIALS AVAILABLE FREE: Nos. 1, 2, 3, 5 - a limited number of copies available from address in C.

L. MATERIALS PURCHASABLE: The Educational Publication Department, Sir Earnest de Silva Mawata, Colombo - 3, Ceylon: No. 4, R^{s}. 2.70 (.60) without postage.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English (except No. 4).

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Sinhala and Tamil.

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: All teachers of biology in the country (grades 9 and 10).

b. Some specific schools where course is being taught: All schools in the country. Teachers are permitted to use alternative schemes, with prior approval, if these schemes embody the principles and extent of pupil experiments in the Departmental Schemes.

P. MATERIALS PRESENTLY BEING DEVELOPED:

6. Pupil Text, Vol. II - Grades 9 and 10.
7. Students' Text, Vol. III - Grades 9 and 10.
8. Evaluation Materials.
9. In-service Material.
10. Background Reading Material.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: (Not including pre-service programmes). Vacation in-service training sessions (2 per year); Week-end, in-service training sessions (4 per month).

R. PROJECT EVALUATION:

a. Instruments used: Essentially Terminal National Examination. (G. C. E. - Ordinary Level).

b. Control groups: Evaluation Research Program prior to initiation of Project.

c. Feedback process: Data from a above; school visits; reports from supervisory staff and selected teachers.

d. Behavioral objectives identified: Bloom's Taxonomy - Cognitive Domain; Krathwohl & Bloom's Taxonomy - Affective Domain.

e. Research evidence of objectives achieved: Data from a above; subjective data from c, above.

f. Other pertinent information: Before introduction of revised syllabuses and Schemes of Work, they were tried out in selected schools and critically discussed by leading educators, UNESCO, consultants, and teachers.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Revision of (new) syllabuses and Schemes of Work; preliminary work on the preparation of syllabuses and Schemes of Work, grades 11 + 12; special projects for pupils in grades 9 and 10; continuation of the evaluation research programme. In preparation, Research Reports on the Project.

A. PROJECT TITLE: CAAS SCHOOL BIOLOGY PROJECT*

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: Ceylon Association for the Advancement of Science, with the cooperation of the Ministry & Department of Education, Ceylon. 1964

C. PROJECT DIRECTOR: V. Basnayake

D. PROJECT HEADQUARTERS ADDRESS: Ceylon Association for the Advancement of Science, 55 Torrington Square, Colombo 7, Ceylon

E. PROFESSIONAL STAFF: Honorary Committee of 15, consisting of university biologists, educationists, school biology teachers, etc. Chairman: S. W. Bibile, Professor of Pharmacology, University of Ceylon, Peradeniya

F. PROJECT SUPPORT: Financial grant from the Ministry of Education (Aid: The Asia Foundation); equipment from the Ministry & Department of Education

G. SPECIFIC PURPOSES AND OBJECTIVES: To improve the teaching of biology in Ceylon Schools at the General Certificate of Education, Ordinary Level.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Biology, G.C. E. O. Level, a two-year course, concurrently with other subjects, including chemistry and physics. Average age of students, 14-16 years.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: The materials are in cyclostyled form and incomplete as yet.

1. Teacher's Guide
2. Student's Exercises
3. Gleanings from biological work done in Ceylon
4. Problems - sample discussions on scientific method based on biological investigations pertaining to Ceylon

J. USE OF PROJECT MATERIALS: The materials are not in school use.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Sinhalese and Tamil

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: Completion of the four volumes mentioned in I can be made available to professional organizations.

O. MATERIALS PURCHASABLE: None

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: No specific plans yet

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: No specific plans yet

R. PROJECT ACTIVITIES SINCE 1965 REPORT: Not previously reported

S. PLANS FOR THE FUTURE: Completion of the volumes already mentioned, and Student's Text

*Response made for 1966 Report

A. PROJECT TITLE: CHEMISTRY, CURRICULUM DEVELOPMENT PROJECT

B. PROJECT DIRECTOR: Mr. B. J. P. Alles, Deputy Director General, Secondary Education Branch, Ministry of Education, Malay Street, Colombo 2, Ceylon, Tel. 79552

C. PROJECT HEADQUARTERS:
   a. Address: Education Research, Secondary Education, Ministry of Education, Colombo 2, Ceylon, Contact: J. Ratnaike
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: J. Ratnaike and A. M. Ranaweera, Lecturers, Science Training College, Ministry of Education

E. PROJECT SUPPORT:
   a. Organisational sponsorships: The Ministry of Education, Government of Ceylon
   b. Funding agencies: The Ministry of Education, UNESCO, UNICEF, CREDO, Asia Foundation

F. PROJECT HISTORY:
   a. Principal originators: The Ministry of Education
   b. Date and place of initiation: 1961; Colombo, Ceylon
   c. Reason for initiation: No systematic revision of Chemistry curricula for a considerable period; To gear the curricula to local environment; Recognition of a major change in the pupil population (95% non-university stream).

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: None described

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Chemistry - Grades 9,10 (Age Levels 14-15+)

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Revised syllabus
   2. Detailed Schemes of Work
   3. Detailed list of apparatus
   4. Pupil Text Vol. I - Grades 9 and 10
   5. Evaluation materials

K. MATERIALS AVAILABLE FREE: Items 1, 2, 3, 5; Limited number of copies available from address in "C".

L. MATERIALS PURCHASABLE: Item 4, Sir Earnest de Silva Mawata, The Educational Publications Department, Colombo 3, Ceylon, Rs. 2/50 ($0.50) without postage

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English (Except Item 4)

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Sinhala and Tamil

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: All teachers of chemistry in the country (grades 9,10)
   b. Some specific schools where course is being taught: All Schools in the country. (Teachers are permitted to use alternative

schemes, with prior approval, if these schemes embody the principles and extent of pupil experiments in the Departmental Schemes).

P. MATERIALS PRESENTLY BEING DEVELOPED:

6. Pupil Text Vol III - Grades 9 and 10
7. Pupil Text Vol. III - Grades 9 and 10
8. Evaluation material
9. Inservice material
10. Background reading material

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: (Not including preservice programmes) Vacation inservice training sessions (2 per year); Weekend inservice training sessions (4 per month).

R. PROJECT EVALUATION:

a. Instruments used: Essentially Terminal National Examination (GCE - Ordinary Level).

b. Control groups: Evaluation Research Programme prior to initiation of the Project.

c. Feedback process: Data from a; School visits; Reports from supervisory staff and teachers.

d. Behavioral objectives identified: Bloom's Taxonomy: Cognitive Domain; Krathwall and Bloom's Taxonomy: Affective Domain.

e. Research evidence of objectives achieved: Data from a; Subjective data from c.

f. Other pertinent information: Before introduction of revised syllabi and schemes, they were tried out in selected schools and critically discussed by leading educationists, UNESCO consultants and teachers.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported

T. PLANS FOR THE FUTURE: Revision of existing (new) syllabi and schemes of work (grades 9,10); Preliminary work on the preparation of syllabi and schemes of work graded 11 and 12 and incorporation of UNESCO Chem. Project material from Bangkok; Special projects for pupils (grades 9,10); Continuation of the evaluation research programme; In preparation - Research Reports on the Project.

A. PROJECT TITLE: EVALUATION RESEARCH PROJECT

B. PROJECT DIRECTOR: Mr. B. J. P. Alles, Deputy Director General, Secondary Education Branch, Ministry of Education, Malay Street, Colombo 2, Ceylon, Tel. 79552

C. PROJECT HEADQUARTERS:
a. Address: Education Research, Secondary Education, Ministry of Education, Colombo 2, Ceylon, Contact: J. Ratnaike
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: J. Ratnaike, Lecturer, Science Training College Ministry of Education; P. Samaranayaka and M. P. Lewis, Teachers, Ministry of Education

E. PROJECT SUPPORT:
a. Organisational sponsorships: The Ministry of Education, Government of Ceylon
b. Funding agencies: The Ministry of Education, UNESCO, UNICEF, CREDO, Asia Foundation

F. PROJECT HISTORY:
a. Principal originators: The Ministry of Education
b. Date and place of initiation: 1960; Colombo, Ceylon
c. Reason for initiation: Extension of previous pilot project; Action Research Programme coupled to Curricula Revision; and to provide data for consideration of validity and reliability of evaluation practices in a developing country.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: None described

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Chemistry, Physics, Biology Grades 9,10 (Age Levels 14 - 15+) correlation with First Language, Second Language, Mathematics

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: 1. Data Analysis of Pilot Text and December 1965 National Test

K. MATERIALS AVAILABLE FREE: Very limited - from address in "C".

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Sinhala, Tamil

O. USE OF PROJECT MATERIALS: Essentially for use by Designs Staff Control Examiners and supervisery staff. But parts used in in-service training.

P. MATERIALS PRESENTLY BEING DEVELOPED:
2. Item objective and content (Tables of specifications) Analyses and correlation validity studies.
3. Variation and Achievement with sex, instruction media, language ability, mathematical ability, language ability

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None

R. PROJECT EVALUATION:

a. Instruments used: National Grade 10 Examination (for 40,000 pupils).

b. Control groups: Pilot Evaluation Research Programme

c. Feedback process: School visits; Reports from Control/Chief/ Marking examiners; Reports from supervisions staff

d. Behavioral objectives identified: Bloom's Taxonomy: Cognitive Domain

e. Research evidence of objectives achieved: Presently available data

f. Other pertinent information: The present project devices its data from an 8% stratified random sample of the 40,000 pupils sitting for the national 10th Grade (15 + year) examination

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported

T. PLANS FOR THE FUTURE: In preparation - Research Reports on the Project; Variation of Achievement with teacher qualification, service time, efficiency; with science teaching facilities, annual hours of science instruction, size of school with size of community, educational expenditure; objective Test Batteries for use by Teacher, Supervisery Staff and Design Staff.

A. PROJECT TITLE: GENERAL SCIENCE CURRICULUM DEVELOPMENT PROJECT

B. PROJECT DIRECTOR: Mr. B. J. P. Alles, Deputy Director General, Secondary Education Section, Ministry of Education, Malay Street, Colombo 2, Ceylon, Tel. 79552

C. PROJECT HEADQUARTERS:
a. Address: General Science Project, Education Research, Secondary Education Section, Ministry of Education, Malay Street, Colombo 2, Ceylon, Contact: Mr. J. Jayasuriya, Chief Education Officer
b. Facilities available for viewing: Science Teacher Training Institutes; Audio Visual Aids Centre; Planetarium; Science Library; Nucleus of an In-service Science Laboratory; Science Equipment Manufacturing Unit; Activities: vacation courses for general science teachers; weekend study circles for general science teachers; study circles for science lecturers of teacher training institutes; a special training programme for science pilot teachers; general science lessons conducted in schools for curriculum preparation; preparation of general science course guides and evaluation.

D. PRINCIPAL PROFESSIONAL STAFF: J. Jayasuriya, Chief Education Officer, Ministry of Education; A. D. Mahendrasena, Lecturer (Teacher Training College) Ministry of Education; K. B. S. Witjeratne, Science Teacher, Ministry of Education

E. PROJECT SUPPORT:
a. Organisational sponsorships: Ministry of Education, Government of Ceylon
b. Funding agencies: The Ministry of Education, UNESCO, UNICEF, CREDO, Asia Foundation

F. PROJECT HISTORY:
a. Principal originators: The Ministry of Education
b. Date and place of initiation: July 15, 1964; Department of Education, Colombo
c. Reason for initiation: Lack of specific Guidance and Instruction in the implementation of the then existing Schemes and Syllabi in General Science.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: None described

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: General Science covering Elements of Chemistry, Biology, Physics, Earth Sciences and Astronomy; Grades VI through VIII; Age: 11 to 13+.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: 1. A tentative Scheme for teachers giving the necessary instructions on teaching procedures, preparation of improvised apparati and other teaching aids and also the expected major teaching outcomes. 2. A Course Guide on the above scheme prepared in the light of feedback information from Pilot teachers and from evaluation programme.

K. MATERIALS AVAILABLE FREE: Items 1 and 2 (referred in "J") can be obtained from the Secondary Education Section, Ministry of Education, Malay Street, Colombo 2, Ceylon.

L. MATERIALS PRUCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Sinhala

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Tamil

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: 1,000 teachers
  b. Some specific schools where your course is being taught: About 1,000 schools including approximately 800 Senior Secondary Schools follow the Course.

P. MATERIALS PRESENTLY BEING DEVELOPED:
  3. A Tentative Scheme cum Course Guide in General Science for Grade VII.
  4. A Tentative Scheme cum Course Guide in General Science for Grade VIII.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Weekend In-service Training Sessions are being planned to be held at District Centres.

R. PROJECT EVALUATION:
  a. Instruments used: Term Tests
  b. Control groups: None
  c. Feedback process: Data from a; School visits; Reports from supervising staff and teachers.
  d. Behavioral objectives identified: Bloom's Taxonomy: Cognitive Domain
  e. Research evidence of objectives achieved: Being planned under "c".
  f. Other pertinent information: Before introduction of revised syllabi and schemes, they were tried out in selected schools and critically discussed by leading educationists and teachers.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Revision of existing new syllabi and schemes of work; Finalizing materials mentioned in "P".

A. PROJECT TITLE: MATHEMATICS CURRICULUM DEVELOPMENT PROJECT

B. PROJECT DIRECTOR: B. J. P. Alles, Deputy Director General, Secondary Education Branch, Ministry of Education, Malay St., Colombo 2, Ceylon. Tel: 79552.

C. PROJECT HEADQUARTERS:
a. Address: Education Research, Secondary Education, Ministry of Education, Colombo - 2 Ceylon. Contact D. A. Perera.
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: D. A. Perera, Lecturer, Science Training College, Ministry of Education; L. A. Devendra, Lecturer, Government Training College, Maharagama, Ministry of Education.

E. PROJECT SUPPORT:
a. Organizational sponsorships: The Ministry of Education, Government of Ceylon.
b. Funding agencies: Ministry of Education, Asia Foundation, UNESCO, UNICEF, CREDO.

F. PROJECT HISTORY:
a. Principal originator: Ministry of Education.
b. Date and place of initiation: Jan., 1964; Colombo, Ceylon.
c. Reason for initiation: Mathematics not being taught in nearly 80% of the Secondary Schools. No systematic revision of the curriculum for a considerable period.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Does not apply.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics - Grades 6 to 10; ages 11+ to 15+.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Detailed Schemes of Work for Teachers - Grade 6.
2. Detailed Schemes of Work for Teachers - Grade 7, 1st Term in print.
3. Students' Text, Vol. 1, Grade 6.

K. MATERIALS AVAILABLE FREE: Nos. 1, 2 - A very limited number of copies from address listed in C above. (No. 2 is not available till about May).

L. MATERIALS PURCHASABLE: From the educational Publications Department, Sir Earnest de Silva Mawata, Colombo - 3, Ceylon.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Sinhala and Tamil.

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: Math teachers in Grades 6 and 7.
b. Some specific schools where course is being taught: The Schemes of Work are: Obligatory (teachers are allowed to use alternative schemes with prior approval which cover the same

content.)

P. MATERIALS PRESENTLY BEING DEVELOPED:

4. Students' Text - Vol. II, Grade 6.
5. Detailed Schemes of Work for Teachers - Grade 7, 2nd Term.
6. Provisional Syllabuses for Grades 8, 9, 10.
7. Multiple Choice - Test Battery for Grade 6.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Week-end, in-service Training Sessions based on the Schemes of Work; approximately one session a month.

R. PROJECT EVALUATION:

a. Instruments used: At the time of writing, none.

b. Control groups: No

c. Feedback process: Meetings with selected teachers; visits to selected schools.

d. Behavioral objectives identified: Using only Bloom's Taxonomy - Cognitive Domain. Krathwohl and Bloom's Taxonomy - Affective Domain.

e. Research evidence of objectives achieved: None

f. Other pertinent information: Majority of 6th and 8th grade teachers have inadequate academic qualifications in mathematics; the majority of schools are ill-equipped.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Continued preparation of curriculum materials and in-service training. A revision of the Schemes of Work for the 6th grade was undertaken. The proposed bulletins were not produced.

T. PLANS FOR THE FUTURE: Continuing the production of new curriculum material in-service training, and revision of the 6th grade Schemes of Work. Members of the Project are working on a full-time basis.

A. PROJECT TITLE: PHYSICS, CURRICULUM DEVELOPMENT PROJECT

B. PROJECT DIRECTOR: Mr. B. J. P. Alles, Deputy Director General, Secondary Education Division, Ministry of Education, Malay Street, Colombo-2, Ceylon, Tel. 79552

C. PROJECT HEADQUARTERS:
a. Address: Education Research, Secondary Education, Ministry of Education, Colombo 2, Ceylon, Contact: W. A. N. Fernando.
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: W. A. N. Fernando and D. de S. Mutucumarana, Vice Principals, Ministry of Education

E. PROJECT SUPPORT:
a. Organizational sponsorships: The Ministry of Education, Govt. of Ceylon
b. Funding agencies: The Ministry of Education, UNESCO, UNICEF, CREDO, Asia Foundation

F. PROJECT HISTORY:
a. Principal originators: Ministry of Education
b. Date and place of initiation: 1961; Colombo, Ceylon
c. Reason for initiation: No systematic revision of Physics curricula for a considerable period; To gear the curricula to local environment; Recognition of a major change in the pupil population (95% non-university stream).

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: None described

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Physics, Grades 9, 10 (Age Levels 14 - 15+)

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Revised syllabus
2. Detailed Schemes of Work
3. Detailed list of apparatus
4. Pupil Text (Vol. 1) Grades 9 and 10
5. Evaluation materials

K. MATERIALS AVAILABLE FREE: Items 1, 2, 3, 5 - Limited number of copies available; from address in "C".

L. MATERIALS PURCHASABLE: Item 4. Earnest de Silva Mawata, The Educational Publications Dept., Ministry of Education, Colombo 3, Ceylon

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English (Except #4)

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Sinhala and Tamil

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: All teachers of Physics in the country (grades 9,10)
b. Some specific schools where course is being taught: All schools in the country. (Teachers are permitted to use alterna-

tive schemes, with prior approval, if these schemes embody the principles and extent of pupil experiments in the Departmental Schemes.)

P. MATERIALS PRESENTLY BEING DEVELOPED:

6. Pupil Text Vol. III - Grades 9,10
7. Pupil Text Vol. III - Grades 9,10
8. Evaluation material
9. Inservice material
10. Background reading material

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: (Not including preservice programmes) Vacation inservice training sessions (2 per year); Weekend inservice training sessions (4 per month).

R. PROJECT EVALUATION:

a. Instruments used: Essentially Terminal National Education (G.C.E. - Ordinary Level)

b. Control groups: Evaluation Research Programme prior to initiation of the Project

c. Feedback process: Data from a; School visits; Reports from supervisory staff and teachers

d. Behavioral objectives identified: Bloom's Taxonomy: Cognitive Domain; Krathwohl & Bloom Taxonomy: Affective Domain

e. Research Evidence of objectives achieved: Data from a; Subjective data from c.

f. Other pertinent information: Before introduction of revised syllabi and schemes, they were tried out in selected schools and critically discussed by leading educationists, UNESCO consultants and teachers.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported

T. PLANS FOR THE FUTURE: Revision of existing (new) syllabi and schemes of work (grades 9,10); Preliminary work on the preparation of syllabi and schemes of work graded 11 and 12 and incorporation of UNESCO Chem. Project material from Bangkok; Special projects for pupils (grades 9,10); Continuation of the evaluation research programme; In preparation - Research Reports on the Project.

A. PROJECT TITLE: PROGRAMA DE PROFECCIEMENTO (PROGRAM OF IMPROVEMENT)- SANTIAGO, CHILE*

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: For science area, Abraham S. Fischler. October 1963

C. PROJECT DIRECTOR: Hector Croxatto, Coordinator

D. PROJECT HEADQUARTERS ADDRESS: 439 Castro, Santiago, Chile

E. PROFESSIONAL STAFF: Dario Moreno, Chairman, Science Department; Louis Cappuro; R. Espenozo; Al Braswell

F. PROJECT SUPPORT:
  a. Organizational sponsorship: Ministry of Education
  b. Funding agency: Ford Foundation

G. SPECIFIC PURPOSES AND OBJECTIVES: To develop a new K-12 science program and to build ways of modernizing in-service teacher education.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Language arts, social studies, mathematics and science are included in grades kindergarten through 12.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: The first materials are available for grades 1-2 of the elementary school and grade 7 of the junior high school.

J. USE OF PROJECT MATERIALS: This will be decided in experimental schools during the year 1966.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Spanish

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: English

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: Ultimately a totally new science program will be developed.

N. MATERIALS AVAILABLE FREE: None described

O. MATERIALS PURCHASABLE: None described

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: It will resemble the AAAS process approach.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: An in-service training program is being developed. It will handle roughly 80 teachers at a time for three month periods. Thus, it will train 320 teachers a year in the area of science. These teachers will come to Santiago and live in dormitories and continue to draw their pay from the Ministry.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: During the month of March a short one month course was organized for seventh grade teachers, since the seventh grade is now becoming part of the elementary schools organization. This move was an attempt to try to keep children in school at least one year longer. Ultimately the plan is to have nine years of education before specialization.

S. **PLANS FOR THE FUTURE:** None described

*Response made for 1966 Report

A. PROJECT TITLE: IMPROVEMENT OF SCIENCE TEACHING IN COLOMBIA

B. PROJECT DIRECTOR: Alberto Ospina, Fundación para el Fomento Educativo, Calle 19 #6-68 Oficina 1007, Bogotá - Colombia S. A.

C. PROJECT HEADQUARTERS:
   a. Address: Science Teaching Center (in Spanish: "Instituto de Ciencias") Carrera 13 #38-83, Bogotá - Col. S. A. Contact Dr. Josué Muñoz, Director Science Teaching Center.
   b. Facilities available for viewing: The Science Teaching Center.

D. PRINCIPAL PROFESSIONAL STAFF: Josué Munoz, Director; Inés Triana, Assistant to the Director; Washington Fernández, Physics Program.

E. PROJECT SUPPORT: Fundacion para el Fomento Educativo, Ministry of Education of Colombia, Peace Corps. of the U. S.

F. PROJECT HISTORY:
   a. Principal originators: Alberto Ospina; Juán Herkrath; Josué Muñoz.
   b. Date and place of initiation: 1965; Bogotá - Colombia, S. A.
   c. Reason for initiation: The need to introduce new curricular developments in Colombia.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To improve science teaching in Colombia; to make available new materials and textbooks to Colombian science teachers and students.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics, Physics, Biology, Chemistry; mainly to secondary level. In a lesser degree, to elementary and university levels.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. PSSC equipment and textbooks.
   2. E.S.I.-E.S.S. Science Units.
   3. Translation of PSSC, CHEMS Study and BSCS textbooks.

K. MATERIALS AVAILABLE FREE: Newsletter.

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Spanish

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using your materials: 1000 teachers.
   b. Some specific schools where course is being taught: Official Public Schools.

P. MATERIALS PRESENTLY BEING DEVELOPED: None described.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Summer Institutes, night courses given by the S.T.C. or with the cooperation of the S.T.C. by the Schools of Education of Colombian Universities.

R. PROJECT EVALUATION:

- a. Instruments used: Feedback information; field visits by inspectors.
- b. Control groups: No
- c. Feedback process: As described in a.
- d. Behavioral objectives identified: No
- e. Research evidence of objectives achieved: More than 10,000 copies of the PSSC textbook sold.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Three Interamerican Physics Institutes held in Tunja, Bogotá and Cali, for 150 University Professors and High School Teachers. More than 20 local Institutes in several cities of Colombia, on PSSC, BSCS, and CHEMS.

T. PLANS FOR THE FUTURE: A Berkeley Physics Institute at the National University next June; A Science Fair and exposition; Several local Seminars in Colombian cities.

A. PROJECT TITLE: PRODUCTION OF BSCS MATERIALS TRANSLATED AND ADAPTED TO THE TROPICAL ENVIRONMENT*

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: This project originated at the University of Colorado, Boulder, during the second BSCS writing conference in 1961.

C. PROJECT DIRECTOR: Humberto Gómez

D. PROJECT HEADQUARTERS ADDRESS: Universidad de Antioquia, Medellin, Colombia, S.A.

E. PROFESSIONAL STAFF: Roberto Galán, Professor of Biology, Universidad de los Andes, Bogotá; José Vicente Alvarez, Director "Editorial Norma", Cali, Colombia; Gabriel Roldán, Professor of Biology, Universidad de Antioquia.

F. PROJECT SUPPORT:
a. Organizational sponsorship: At the present time, this is a self-sustained program.
b. Funding agency: The Ford Foundation gave its support to initiate the program.

G. SPECIFIC PURPOSES AND OBJECTIVES: To produce modern biology materials for secondary school students. Simultaneously we have been working with the secondary school teachers, training them in how to use the new materials. We have also translated the BSCS Biology Teacher's Handbook and the Teacher's Guide. We are working with the BSCS Green Version in Spanish.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Secondary school materials for students 14-15 years of age. These are usually 9th to 10th grade. Some trials have been made with pre-university students during their first year biology course.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:
1. "Curso de Biología", Spanish edition of the BSCS Green version
2. "Manual para profesores de Biología", Spanish translation of the BSCS Teacher's Handbook. In print, ready in November 1966.
3. "Guia para el profesor", Spanish edition of the BSCS Teacher's Guide. In print, ready in December 1966.

J. USE OF PROJECT MATERIALS: Around 100 teachers are using the complete program and 200 others are using some of the materials. Specific schools where the materials are used: Estudios Generales; Universidad de Antioquia; Universidad de los Andes; Universidad del Valle; Instituto Pedagógico Nal. Instituto Pedagógico.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Spanish

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: 4. Pamphlets on Biology subjects.

N. MATERIALS AVAILABLE FREE: Nos. 1, 2, 3. Order from: "Editorial Norma", Cali, Colombia, S.A. Free in small numbers (4 of each).

O. MATERIALS PURCHASABLE: Nos. 1, 2, 3 in lots of five or more, same address

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: We are developing impact and achievement tests. These have been tried out among pre-university students.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Each of the centers where the materials have been used has established a formal training program for secondary school teachers. This program may be completed in one of the following ways: (1) one semester course with an average of 160 hours; (2) one summer course; (3) annual program with an average of 200 hours. We usually divide these courses into levels I and II, the former being a pre-requisite to attend the latter.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: None previously reported

S. PLANS FOR THE FUTURE: We have established at this University a program of basic physics and chemistry for science teachers to start June 20, 1966. In August, 1966 we will have our II level BSCS course. During July and August, 1966, a summer course will be held in Quito, Ecuador, using our materials.

*Response made for 1966 Report

A. PROJECT TITLE: CENTER FOR MODERNIZATION OF MATHEMATICS AND PHYSICS TEACHING (KABINET PRO MODERNIZACI VYUCOVANI MATEMATICE A FYZICE)

B. PROJECT DIRECTOR: Miloslav Valouch, Professor of Physics, Faculty of Mathematics and Physics of the Carles University, Ke Karlovu 3, Praha 1, Czechoslovakia

C. PROJECT HEADQUARTERS:
a. Address: Kabinet pro modernizaci vyučování matematice a fyzice, Žitná 25, Praha 1, Czechoslovakia, Contact: Project Director
b. Facilities available for viewing: Visit of an experimental school with trial mathematics teaching

D. PRINCIPAL PROFESSIONAL STAFF: Miloš Lánský, Professor of Mathematics, Faculty of Pedagogics of the Charles University, Assistant Director and Head of the Mathematics Section; Karel Hruša, Professor of Mathematics Teaching Methodology, Faculty of Pedagogics of the Charles University, Team Leader; Miloslav Valouch, Director and temporary Head of the Physics Section; Josef Fuka, Professor of Physics, University in Olomouc, Team Leader; about sixty additional university and secondary school teachers and scientific workers as steering committee members, external collaborators and consultants are working in the Center at various times.

E. PROJECT SUPPORT:
a. Organizational sponsorship: Jednota československých matematiků a fyziků (Union of Czechoslovak Mathematiciens and Physicists)
b. Funding agencies: Czechoslovak Academy of Science and Ministry of Education

F. PROJECT HISTORY:
a. Principal originator: Jednota československých matematiků a fyziků (Union of Czechoslovak Mathematiciens and Physicists), Valdštejnské nám. 4, Praha 1
b. Date and place of initiation: The Center was founded toward the end of 1965. The first program of modernized mathematics teaching was prepared in a commission of the Union of Czechoslovak Mathematiciens and Physicists initiated mainly by Miloš Jelínek (Institute of Pedagogics of the Czechoslovak Academy of Sciences) and Jan Vyšín (Faculty of Mathematics and Physics of the Charles University) in 1963. This voluntary work in the Union was encouraged by the Ministry of Education and the Czechoslovak Academy of Sciences; during 1965 a more stable organization of this work was created by founding the Center.
c. Reason for initiation: The need for scientifically founded data for the improvement of school teaching in individual sciences.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The major objective of the center program is to stimulate and to organize the theoretical and experimental research concerning the possibilities of essential heightening of the social effectiveness of mathematics and physics teaching with regard to the prospective needs of a highly developed society. The results of the research will serve as foundation for successive modernization of teaching in primary and secondary schools executed by state educational authroties and for the improvement of pre-service and in-service education of teachers.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: A new conception of mathematics teaching in the Fundamental nine-year school (age of pupils 6 - 15 years, grades 1 - 9) is being studied and partly examined in several pilot classes using preliminary experimental tests. In physics the methods of more profound acquaintance with important phenomena and concepts in 4th - 6th grades (systematic course of physics being in 7th - 9th grades) are studied and preliminary examination occurs in pilot classes. The objectives and the corresponding contents of physics and mathematics courses on secondary school (age 15 - 18 years, grades 1 - 3) are theoretically studied and a preliminary examination of some topics is in preparation.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Introduction to Modern Mathematics, a preliminary experimental text for brighter pupils in grade 6, Part I and Part II.
2. Combinatorics, a preliminary experimental text for grade 7 (for brighter pupils).
3. Relations, a preliminary experimental text for grade 7 (for brighter pupils).
4. Pilot program of mathematics teaching in grade 1
5. Pilot program of mathematics teaching in grade 2
6. Pilot program of mathematics teaching in grade 3

K. MATERIALS AVAILABLE FREE: None listed

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Only in Czech

N. LANGUAGES INTO WHCIH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: About 30

b. Some specific schools where course is being taught: As yet three Fundamental nine-year schools in Praha, Brno and Bratislava are used as pilot schools.

P. MATERIALS PRESENTLY BEING DEVELOPED: Theoretical studies of some themes (to be published in Journals) and further experimental texts.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Only teachers in pilot schools are specially trained.

R. PROJECT EVALUATION:

a. Instruments used: The teachers reports of their experiences are the main form of control. A little series of short tests of the topics mentioned in "J" is preliminarily used.

b. Control groups: Not yet

c. Feedback process: The teachers reports and the tests are examined in correspondent working groups and the results are used for the planning of further studies and experiments.

d. Behavioral objectives identified: Not yet

e. Research evidence of objectives achieved: None reported

f. Other pertinent information: We are studying how to evaluate a new, complete curriculum.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Several teams working on some partial problems were formed, the studies and experiments were continued and extended a little, but the whole work is still in the beginning stages.

T. PLANS FOR THE FUTURE: To continue the work on the program of the Center giving special attention to the primary school level in the future.

A. PROJECT TITLE: INSTITUTE FOR THE TEACHING OF PHYSICAL SCIENCES

B. PROJECT DIRECTOR: Karl Hecht, 23 Kiel Germany, Olshoussen Street 40-60, Building 34, New University Kiel. Tel: 593-2545.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B, Contact Dr. Karl Hecht.
   b. Facilities available for viewing: None at present.

D. PRINCIPAL PROFESSIONAL STAFF: Director of Study: Johann Weninger, Chemistry Section Leader; Study Staff: Werner Dierks, Assistant in Chemistry Section; Hans Jorg Niedderer, Assistant in Physics Section.

E. PROJECT SUPPORT: Foundation for the promotion of the teaching of physical sciences.

F. PROJECT HISTORY:
   a. Principal originator: Association of technical and physical sciences societies of Germany.
   b. Date and place of initiation: January 12, 1966, Kiel, Germany.
   c. Reason for initiation: Research in the area of teaching physical sciences.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Improvement in the techniques of teaching physical sciences.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Teaching of physical sciences in high schools and advanced educational courses for high school teachers specializing in the instruction of physical sciences.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: None

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: None at present.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Not available.

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS: Not available.

P. MATERIALS PRESENTLY BEING DEVELOPED:
   1. Instruction in physical sciences.
   2. Instruction of chemistry to beginners
   3. Introductory instruction in organic chemistry.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None

R. PROJECT EVALUATION: Not available.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not available.

T. PLANS FOR THE FUTURE: Not developed in detail yet.

A. PROJECT TITLE: MATHEMATICS IN EDUCATION AND INDUSTRY (M.E.I.)

B. PROJECT DIRECTOR: S. L. Parsonson, 57 High St., Harrow on the Hill, Mddx., U. K. Tel: Byron 5267.

C. PROJECT HEADQUARTERS:
a. Address: Same as B.
b. Facilities available for viewing: Only a little peripheral computing equipment.

D. PRINCIPAL PROFESSIONAL STAFF: All members of this Project are serving schoolmasters.

E. PROJECT SUPPORT:
a. Organizational sponsorship: Industrial Committee of the Mathematics Association of Great Britain.
b. Funding agency: Supported by B.P.-Shell-Mex.

F. PROJECT HISTORY:
a. Principal originator: B. T. Bellis, Esq.
b. Date and place of initiation: 1962, Highgate, London N. 6.
c. Reason for initiation: To effect liaison between industry and education. Like to develop syllabuses in the light of experience as gained above.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: See F. Among many experiments being conducted are: attempts to modernise the structure of advanced school mathematics exams; to introduce statistics as a serious and respectable school subject; to introduce computors and computing into the schools.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics only; A/S levels (with also an additional mathematics exam at 'O' level); roughly 15+ years.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: Books, as follows:
1. Vectors and Matrices, Neill & Moaher (Olive & Boyd);
2. Probability, with Application to Statistics, Moaher (Macmillan);
3. Straightening the Crooked, Goldstein (Olive & Boyd). Exercises in computing for boys and girls.
Also:
4. Specimen papers at O/A/S levels.
5. Syllabus A/S levels.
6. Industrial Report 1966.

K. MATERIALS AVAILABLE FREE: Items Nos. 4-6.

L. MATERIALS PURCHASABLE: Items Nos. 1-3 (they are not yet published in permanent book form).

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Very difficult to estimate.

b. Some specific schools where course is being taught: Harrow School; St. Paul's; Highgate; Rugby; St. Dunstan's; Westminster; Bedford; Dundle, etc.

P. MATERIALS PRESENTLY BEING DEVELOPED:

7. A number of texts on numerical methods and elementary statistics.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Courses run on computer programming, etc. Usually in London.

R. PROJECT EVALUATION:

a. Instruments used: None described.

b. Control groups: Some are being initiated at University College School to analyze the effects of computer education.

c. Feedback process: None as yet.

d. Behavioral objectives identified: No

e. Research evidence of objectives achieved: Nothing very concrete yet, but there has been a significant increase in demand to specialise in mathematics, 'O' level.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: To extend activities and publications as above. The object of the Project is to interest and instruct the teacher as well as the pupil and we shall strive to continue this.

A. PROJECT TITLE: THE MIDLANDS MATHEMATICAL EXPERIMENT (MME)

B. **PROJECT DIRECTOR:** Cyril Hope, Worcester College of Education, Henwick Grove, Worcester.

C. **PROJECT HEADQUARTERS:**

a. Address: Same as B; Also R. H. Collins (Secretary to M.M.E.), Headmaster, Harold Malley School, Solihull, Warwickshire. Contact either Mr. Hope or Mr. Collins.

b. Facilities available for viewing: Classes in action at variety of schools.

D. **PRINCIPAL PROFESSIONAL STAFF:** Cyril Hope, Principal Lecturer, Worcester College of Education; Ray Stokes, Senior Mathematics Master, Harold Malley School, Solihull.

E. **PROJECT SUPPORT:** Self-supporting.

F. **PROJECT HISTORY:**

a. Principal originator: Cyril Hope.

b. Date and place of initiation: Sept. 1961; Harold Malley School (see item C).

c. Reason for initiation: To produce a new G.C.E. O level syllabus in new topics suitable as a general education in mathematics.

G. **PRESENT COMMERCIAL AFFILIATIONS:** Contract with Harrap & Company to publish work of M.M.E.

H. **PURPOSES AND SPECIFIC OBJECTIVES:** It is not specifically aimed at the future mathematician in the age range 11-16, but tries to give a general introduction to set language, number systems, linear transformations, matrices, switching Algebra, Vector Geometry, Analysis and Calculus of simple algebraic polynomial functions and probability and statistics, and some idea of numerical methods. Teaching materials and methods are being developed to cover the whole ability range. M.M.E. is developing as a sequel to the K-16 cycles at 16-18 G.C.E. A-level syllabuses for mathematicians and others who will make major use of mathematics at university and colleges of technology.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** Mathematics, O-level, 11-16 (top 20% of ability range); Certificate of Education, 11-16, (Middle of ability range); Mathematics A-level, 16-18 (top 15% of ability range).

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:** Textbooks in draft form

1. Midlands Mathematical Experiment Book I-O Level 7/6
2. Midlands Mathematical Experiment Book II-O Level 11/6
3. Midlands Mathematical Experiment Book III-O Level 12/6
4. Definitive text, age 11-13, Book I (March 1967) --

Reports

5. Midlands Mathematical Experiment Report 1961-62 5/-
6. Midlands Mathematical Experiment Report 1963-65 10/-
7. Experimental Materials for Newsome Children (lower 25% of ability range) - available from Secretary March 1967.

The materials listed in item J are published by Harrap and Company, England.

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: See item J.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: 140 schools.
   b. Some specific schools where course is being taught: Refer to Secretary, M.M.E.

P. MATERIALS PRESENTLY BEING DEVELOPED:
   8. Teaching Materials for Advanced Level (pre-University Course).

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Monthly meetings at three centres, Manchester, Birmingham, Harlow New Town (details from the Secretary); Two Saturday conferences each term at a school in Birmingham; Annual 10-day course/conference at Worcester College of Education each summer - 3 levels of instruction: introductory, intermediate and advanced.

R. PROJECT EVALUATION:
   a. Instruments used: This in progress of formation in consultation. Write Prof. Taylor, Department of Education, University of Birmingham, Birmingham.
   b. Control groups: None except comparison with successive years.
   c. Feedback process: Each teacher returns commentary on each section of teaching texts giving breakdowns, successes, alternative treatments, reaction of pupils, ability group taught.
   d. Behavioral objectives identified: Attitude to mathematics; approach to novel problems; use of mathematical models where appropriate; ability to suggest approaches and to discuss possibilities concerning novel problems.
   e. Research evidence of objectives achieved: Subjective judgment of teachers - June 1967. Public Examination of 500 pupils.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Writing of Text Material for: higher ability groups 13-16, middle ability groups 13-16, and higher ability groups 16-18; development of mathematical topics suitable for bottom 25% of ability range; research into problems connected with teaching of mathematics.

A. PROJECT TITLE: NUFFIELD A-LEVEL BIOLOGY PROJECT

B. PROJECT DIRECTORS: P. J. Kelly; W. H. Dowdeswell

C. PROJECT HEADQUARTERS: Mary Ward House, 5-7 Tavistock Place, London, W.C.1., England, Tel. Euston 0431, Contact: P. J. Kelly

D. PRINCIPAL PROFESSIONAL STAFF: None listed.

E. PROJECT SUPPORT: Nuffield Foundation

F. PROJECT HISTORY:
   a. Principal originators: None described
   b. Date and place of initiation: January 1, 1965; London
   c. Reason for initiation: Improvement of biological education in secondary schools at the sixth form level.

G. PRESENT COMMERCIAL AFFILIATIONS: Publishers - Penguin Ltd.

H. PURPOSES AND SPECIFIC OBJECTIVES: Available on application.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: See "F" above.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: For trial purposes for students: Laboratory Guide and Study Book, Problems Book, Introductory, Review and Background Pamphlets. For teachers: Teacher's Guide, Laboratory Guide, Projects Book, Materials for practical work.

K. MATERIALS AVAILABLE FREE: Reports only. Available on request to project.

L. MATERIALS PURCHASABLE: None at present; commercial publication date early 1970.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed.

O. USE OF PROJECT MATERIALS: On request

P. MATERIALS PRESENTLY BEING DEVELOPED: Examinations, 16mm sound films, film loops, slide transparencies and other visual aids, equipment, apparatus, cultures, etc.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: On request

R. PROJECT EVALUATION:
   a. Instruments used: Questionnaires, observation visits, tests, meetings, reviewing by specialists.
   b. Control groups: None at present.
   c. Feedback process: On request
   d. Behavioral objectives identified: Yes
   e. Research evidence of objectives achieved: On request

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: 1965-66 Preparation of initial materials; 1966-68 Continued preparation of initial materials, trials in schools, evaluation.

T. PLANS FOR THE FUTURE: On request

A. PROJECT TITLE: NUFFIELD BIOLOGY PROJECT

B. PROJECT DIRECTOR: W. H. Dowdeswell, Winchester College, Hampshire, Winchester, England, Tel. Winchester 4584

C. PROJECT HEADQUARTERS:

a. Address: Nuffield Science Teaching Projects, Mary Ward House, 5-7 Tavistock Place, London W.C. 1, Euston 0431, Contact W. H. Dowdeswell

b. Facilities available for viewing: A single London headquarters housing all the Nuffield Science Teaching Projects.

D. PRINCIPAL PROFESSIONAL STAFF: Mostly no longer seconded as Project nearly complete. G. Van Praagh, General organiser, Nuffield O Level Projects; P. J. Kelly, Organiser, Nuffield A Level Project; P. J. Fry, Materials Coordinator A Level Project

E. PROJECT SUPPORT: The Nuffield Foundation

F. PROJECT HISTORY:

a. Principal originators: Nuffield Foundation; Association for Science Education (ASE)

b. Date and place of initiation: 1963; Nuffield Lodge, Regent's Park, London N.W. 1.

c. Reason for initiation: General dissatisfaction with state of biology teaching in late 1950's. Stimulated by work of A.S.E. Biology Committee and work of American B.S.C.S.

G. PRESENT COMMERCIAL AFFILIATIONS: Books published by Longmans/Penguins Ltd. in 1966.

H. PURPOSES AND SPECIFIC OBJECTIVES: Introduction of more up-to-date, and lively approach to Biology involving inquiry rather than factual memorisation. Involved fundamental changes in teaching approach.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Biology for pupils taking English General Certificate of Education (GCE) at O level. Course covers age range 11-16.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Nuffield Biology Teacher's Guide I - V; Nuffield Biology Text I - V
2. Nuffield Biology Film Loops (25)
3. Keys to Small Organisms (for Year III fieldwork)

K. MATERIALS AVAILABLE FREE: Reports of Nuffield Science Teaching Projects; Prospectus of Nuffield Biology Publications; from Project Headquarters

L. MATERIALS PURCHASABLE:

1. Teacher's Guide - 15s., 15s., 20s., 20s., 17s. 6d (I - V)
   Text I - V - 15s. 6d., 13s., 17s. 6d., 22s. 6d., 17s. 6d.
2. Nuffield Biology Film Loops (25) - No price given
3. Keys to Small Organisms (for Year III fieldwork) - 2s. 0d. each

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Not yet decided

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: Unknown
   b. Some specific schools where course is being taught: Information can be supplied on application to Project Headquarters.

P. MATERIALS PRESENTLY BEING DEVELOPED: Nuffield A Level Biology Project, Age range 16-18

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Extensive in-service training programme and short courses run by Local Education Authorities. Details can be obtained from Mary Ward House.

R. PROJECT EVALUATION:
   a. Instruments used: Weekly reports by teachers; Reports of area leaders (groups of schools); Reports by visiting members of project
   b. Control groups: No, not possible
   c. Feedback process: All information sent back to Mary Ward House where it is collated and distributed to writers, etc.
   d. Behavioral objectives identified: Yes
   e. Research evidence of objectives achieved: A great deal from the trial schools (involving about 100 teachers and 4,500 children) but none yet from others. Books only appeared on market last summer.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Improvement of new type of examination developed alongside project. Now incorporated in GCE system.

A. PROJECT TITLE: NUFFIELD FOUNDATION COMBINED SCIENCE PROJECT

B. PROJECT DIRECTORS: M. J. Elwell and C. D. Bingham, Joint Organizers, Nuffield Combined Science Project, Room 213, Haworth Building, P. O. Box 363, The University, Birmingham 15, U. K.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B. Contact M. J. Elwell.
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: As noted above.

E. PROJECT SUPPORT: Nuffield Foundation.

F. PROJECT HISTORY:
   a. Principal originator: Nuffield Foundation.
   b. Date and place of initiation: September 1, 1965, Nuffield Foundation.
   c. Reason for initiation: Educational desirability of approaching science at the age of 11 years as one, and not three subjects, to be taught by one teacher in one laboratory; Demand from education bodies and teachers for a unification of the three separate sciences (Biology, Chemistry, Physics) developed by the Nuffield Science Teaching Project.

G. PRESENT COMMERCIAL AFFILIATIONS: Texts and film loops to be produced and distributed by Longmans-Penguin consortium.

H. PURPOSES AND SPECIFIC OBJECTIVES: Previous programmes (outside the Nuffield Foundation) have produced syllabuses and/or texts, but have not carried through a stage by stage implementation of this - suggesting apparatus requirements - and then testing the programme in a teaching situation.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: The course embodies materials already developed for the separate Nuffield 'O' level courses in Biology, Chemistry, Physics, but is designed for the first two years only of those courses, i.e. from 11-13 years. The materials are being tested over a wide range of ability.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Teacher's Guide Year I.
   2. Apparatus Guide.
   3. Pupil's Book I and II.

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Not known.

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: 70
   b. Some specific schools where course is being taught: See Nuffield Progress Report 1966.

P. **MATERIALS PRESENTLY BEING DEVELOPED:**
   4. Teachers' Guide Year II.
   5. Pupil's Books III and IV.
   6. Film loops for 8 mm cassette.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** A Briefing Conference for a selection of the teachers involved in the trials (at least one teacher per school) was held in July 1966 at Worcester College of Education and a similar conference will be held in July 1967.

R. **PROJECT EVALUATION:**
   a. Instruments used: None described.
   b. Control groups: No formal control groups - although trials teachers will have comparisons to make with other forms in the school not taking the proposed course.
   c. Feedback process: Teachers' comments on the material (accuracy, content, suitability) and children's reactions to it are written directly on to spare pages of the texts and returned weekly to the Combined Science office.
   d. Behavioral objectives identified: Activity, participation, hypothesis formation, mathematical difficulties, thinking in terms of models.
   e. Research evidence of objectives achieved: None described.
   f. Other pertinent information: Further studies of evaluation are to be made by Schools Council.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Writing process, apparatus and film loop investigation continued. Teachers' feedback digested and acted on.

T. **PLANS FOR THE FUTURE:** Initial development and writing will be completed by September 1967 (Pupil's Book IV may be delayed) and the second year of trial will start in September 1967. During 1967 testing of Year II and partial retesting of Year I will be carried out, followed by immediate rewriting ready for publication.

A. PROJECT TITLE: THE NUFFIELD JUNIOR SCIENCE TEACHING PROJECT

B. PROJECT DIRECTOR: E. R. Wastnedge, Mary Ward House, 5-7 Tavistock Place, London, W.C.1., England

C. PROJECT HEADQUARTERS: The Project ended on December 31, 1966 but correspondence should be addressed as above.

D. PRINCIPAL PROFESSIONAL STAFF: J. W. Bainbridge, Staff Tutor, Newcastle Ontyne University Institute of Education; W. E. Betts, Senior Lecturer, Kesteven College of Education; F. F. Blackwell, Inspector, Croydon Education Committee; R. W. Carlisle, Lecturer, Strammillis College of Education; J. Howard, Lecturer, Lincoln College of Education; M. Hardstaff, Biology Master, Marlborough College; L. A. Morgan, Senior Lecturer C. F. Mott College of Education; R. W. Stockdale, Senior Lecturer, Darlington College of Education

E. PROJECT SUPPORT: The Nuffield Foundation

F. PROJECT HISTORY:
  a. Principal originator: The Nuffield Foundation
  b. Date and place of initiation: January 1, 1964; London, England
  c. Reason for initiation: None described

G. PRESENT COMMERCIAL AFFILIATIONS: None described

H. PURPOSES AND SPECIFIC OBJECTIVES: To produce help and guidance for those who wish to use science in the education of children aged 5 to 13 years.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: General Science 5 to 13 year olds

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: (Trial materials)
  1. A Teacher's Guide
  2. A book of classroom examples
  3. Teachers background reading

K. MATERIALS AVAILABLE FREE: 4. Newsletters and Progress Reports from The Nuffield Science Teaching Project, Mary Ward House, Tavistock Place, London W.C.1., England

L. MATERIALS PURCHASABLE: None at present

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed

O. USE OF PROJECT MATERIALS: About 2,000 teachers are using the materials.
  5. Final publications being prepared by William Collins Ltd. of Glasgow
  6. Teachers' Guide I
  7. Teachers' Guide II
  8. Apparatus - A Source book of information for teachers
  9. Animals and Plants - A Source book of information for teachers
  10. Teachers Background Readers; Autumn into Winter; Mammals in

Classrooms; Science and History

11. A film "Into Tomorrow" available in March 1967

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: National Courses organized by The Schools Council of England and Wales followed by regional and local courses. Teachers centres set up in all trial areas (about 50).

R. PROJECT EVALUATION: The Schools Council has just carried out a feasibility study. No details yet available.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The project ended on December 31, 1966.

T. PLANS FOR THE FUTURE: There is to be a continuation project sponsored by the Schools Council of the Nuffield Foundation. It will be organized by Mr. L. F. Ennever and will start in April 1967. Our own publications will be available in August 1967.

A. PROJECT TITLE: NUFFIELD MATHEMATICS TEACHING PROJECT (AGE-RANGE 5 - 13)

B. PROJECT DIRECTOR: Geoffrey Matthews, 12 Upper Belgrave Street, London S.W. 1, England. Tel: BELgravia 5271.

C. PROJECT HEADQUARTERS:

a. Address: Same as B. Contact Miss Anthea Roberts.

b. Facilities available for viewing: It is often possible to arrange a visit to one of the Area Centres or a few schools taking part.

D. PRINCIPAL PROFESSIONAL STAFF: Writing Team 1966/67: I. Campbell, Lecturer at College of Education; R. K. Tobias, Teacher in a Secondary School; D. R. Brighton, Esq., Teacher in a Secondary Modern School; J. H. D. Parker, Esq., Head of Mathematics Department in Secondary Modern School; A. G. Vosper, Esq., Lecturer at Teacher Training College; D. E. Mansfield, Editor of Bulletin.

E. PROJECT SUPPORT:

a. Organizational sponsorships: Nuffield Foundation and Schools Council.

b. Funding agency: Nuffield Foundation.

F. PROJECT HISTORY:

a. Principal originator: Nuffield Foundation.

b. Date and place of initiation: September 1964, London.

c. Reason for initiation: To devise a contemporary approach to mathematics for children from 5 to 13.

G. PRESENT COMMERCIAL AFFILIATIONS: Teachers' guides are being published by a consortium of John Murray and W. K. R. Chambers.

H. PURPOSES AND SPECIFIC OBJECTIVES: See F. It is the first such project in the country for this age-range. Materials are being aimed at the teachers rather than the children. The teachers discuss and develop the materials at Teachers' Centres (of which in 1967 there are 91 involved in the U.K.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: See F.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Draft Teachers' Guides: Computation and structure ② and ③ , Beginnings ① . Pictorial Representation ▢1 , Shape and Size ▽2 and ▽3 , I do and I understand ▼ , Desk Calculators 1▼ , Beginnings ▽1 , How to make a pond 2▼ , Space 3▼ .
2. 16 mm film called "I Do and I Understand". Shows a mathematics class at work in a school in Blackpool.
3. "Multiboard".
4. Bulletin: A report on plans and progress of the Project.

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE:

1. The first half dozen Teachers' Guides will be ready for general publication during 1967.
2. Film obtainable from Sound Services Ltd., Wilton Crescent,

Merton Park, London S.W. 19.
3. Multiboard obtainable from manufacturers, E. Marshall Smith (School Utilities) Ltd., Attn. J. Kennard, 5-9 Church Lane, Romford, Essex, for £6-7-6d.
4. Bulletin obtainable from M. F. Jack, Fanfare Bureau, 516 Forest Road, London E. 17. Cost is 1/2d. plus postage on receipt of invoice.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No. 2, film into Italian.

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: Approximately 2,070 teachers used complete program in 1965. In September 1966 approximately 11,500 will use materials.
b. Some specific schools where course is being taught: Middle Row Junior Mixed School, Kensal Road, North Kensington, London W. 10; New City Primary School, New City Road, Plaistow, London E. 13.

P. MATERIALS PRESENTLY BEING DEVELOPED:
5. Further teachers' guides in the series.
6. Supplementary material, Item J.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: There have been national and regional courses sponsored by the Schools Council, but main responsibility for teacher-training is with the Local Education Authorities.

R. PROJECT EVALUATION: This is obtained via reports, questionnaires and personal liaison, leading to revision of materials. "Check-ups" on the progress of individual children are being prepared by a team from the Institut des Sciences de l'Education, Geneva, who will also later obtain statistical evidence.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The team has had the dual role of writing the Teachers' Guide and maintaining close liaison with the 14 pilot areas. The pilot areas were joined in September 1965 by 77 'second phase' areas.

T. PLANS FOR THE FUTURE: The writing team meets approximately once a month for a full editorial conference. A conference of organisers from both pilot and second-phase areas (involving altogether about 300 people) is being held in April 1967.

A. PROJECT TITLE: "NUFFIELD O-LEVEL PHYSICS TEACHING PROJECT"(NUFFIELD PHYSICS)

B. PROJECT DIRECTOR: Eric M. Rogers (was in charge of project while it developed), Physics Dept., Princeton University, Princeton, N. J. 08540. Tel: 609-452-4395. Kevin Keohane is the Coordinator for all Nuffield Science Projects, acting for the Foundation. Address: Mary Ward House, 5-7 Tavistock Place, London W. C. 1, England.

C. PROJECT HEADQUARTERS:

a. Address: Mary Ward House - See B. Correspondence concerning availability of materials, trial schools, etc.: Coordinator, Mary Ward House, 5-7 Tavistock Place, London W. C. 1, England. Questions about nature of course: most easily answered by consulting Teachers' Guides. Otherwise, consult Eric Rogers.

b. Facilities available for viewing: Many schools in England are now trying this five-year Physics course. The Coordinator (at Mary Ward House) could probably direct visitors to suitable schools. There are also some training courses in colleges in England which might be visited or even joined.

D. PRINCIPAL PROFESSIONAL STAFF: A large group of school and university physicists in England, headed by the following: Organisers: Donald McGill and, later, Eric M. Rogers; Associate Organisers: E. J. Wenham and J. L. Lewis; Assistant Organiser and Deputy Coordinator: D. W. Harding.

E. PROJECT SUPPORT: Entirely sponsored by The Nuffield Foundation, Nuffield Lodge, Regent's Park, London N. W. 1, England.

F. PROJECT HISTORY:

a. Principal originators: The Association for Science Education (in England) suggested a new syllabus and published a Policy Statement on teaching science for understanding. The Nuffield Foundation then provided funds and outlined plans and appointed Organisers to produce a new curriculum scheme.

b. Date and place of initiation: 1962, London.

c. Reason for initiation: The A.S.E.'s syllabus, etc. and the growing wishes of teachers and educational authorities, and the example of PSSC etc. made the time seem ripe for curriculum renewal.

G. PRESENT COMMERCIAL AFFILIATIONS: The Teachers' Guides, Guides to Experiments, and Question Books are all published by Penguin Books and Longmans Green, and copyrighted by the Nuffield Foundation. The suggested apparatus is made by several suppliers in England, but there is no patent to limit manufacture.

H. PURPOSES AND SPECIFIC OBJECTIVES: To offer teachers in Grammar Schools in England (high schools for high academic ability) a five year physics course, leading to external examinations, that emphasize understanding in contrast with memorizing definitions and formulas. Teaching for that aim is carried out by letting students do experiments on their own, with few cookbook instructions (the extra time needed being compensated by some quick, effective demonstration experiments) and by use of questions that require constructive thinking and, above all, by a change of teaching emphasis.

The teachers' Guides provide teachers with many forms of help for teaching towards that aim. See Physics Today, March 1967.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** Physics: a course like "College Board Physics" of PSSC physics, spread over 5 years from age 11-1/2 to 16-1/2. (Similar courses in Biology, Chemistry. Other programmes are in preparation, for Junior Science, Advanced Physics, etc.).

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:**

1. 5 Vols. of Teachers' Guides, Years I, II, III, IV, V.
2. 5 Vols. Guides to Experiments, Years I, II, III, IV, V.
3. 5 Vols. Question Books, Years I, II, III, IV, V.
4. 1 Apparatus List to guide purchasing departments, and manufacturers.
5. "Do-it-yourself" instruction book for making apparatus in school laboratory or shop. Also useful for manufacturers.
6. "X" films for teaching teachers the methods of particular experiments.
7. Many pieces of apparatus, kits for students' work, demonstration devices. A large proportion of these are particular forms of apparatus already available or known elsewhere, but made available for Nuffield trial school in convenient form; a small number are entirely new devices.

K. **MATERIALS AVAILABLE FREE:** A list of the books, etc. that are available commercially may be obtained free from the Office at Mary Ward house, or from the Association for Science Education, 52, Bateman Street, Cambridge, England.

L. **MATERIALS PURCHASABLE:** Nos. 1, 2, 3 (about $2 each for each Year), from Penguin Books (Harmondsworth, Middlesex) or Longmans Green (London); No. 4 may be purchased from Mary Ward House; No. 5: "Do-it-yourself" instructions: laboratory. Only a very few are available. Ultimately, it is hoped these will cover nearly all the equipment. Consult Mary Ward House; No. 6, available on Loan in England from the Esso Corporation; No. 7, Ask Mary Ward House for a list of approved manufactured devices and kits. Or consult major apparatus suppliers in England.

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** Probably Spanish.

O. **USE OF PROJECT MATERIALS:**

a. Number of teachers using materials: Probably about 500 by now.
b. Some specific schools where course is being taught: Schools in England: consult the office at Mary Ward House.

P. MATERIALS PRESENTLY BEING DEVELOPED: The materials are now almost complete:

8. A few special booklets for students may be produced.
9. A book of specimen test and examination questions will be published.
10. "Do-it-yourself" instructions for making apparatus at school are being prepared but are seriously delayed. (Inquire of Mary Ward House).

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Most of the physics teachers in English Grammar schools already have a thorough knowledge of physics (equivalent of an American College Degree majoring in physics); so the training needed is chiefly in changes of style in teaching, and some training in modern physics. Much of that is obtained by reading the Teachers' Guides and keeping them at hand when teaching.

A briefing Institute of about one week--or the equivalent in in-service training, is usually given to teachers embarking on the programme. Training programmes are offered by several colleges in England. Consult the office at Mary Ward House.

R. PROJECT EVALUATION:

a. Instruments used: Consultation with teachers, administrators and students. Inspection by Her Majesty's Inspectors, who are very able scientists and educational critics. Evaluation by the Schools Council. We are anxious to avoid evaluation by acquaintance-lists or traditional achievement tests, which would miss the point of the reforms.

b. Control groups: Yes, traditional physics courses are still running all over England.

c. Feedback process: Teachers reported, during trials, on spare copies of Teachers' Guides. Also, frequent regional meetings of trial teachers gave us considerable guidance for revision.

d. Behavioral objectives identified: Yes, students enjoy doing physics, think their knowledge is something to be proud of, something that will last, and they emerge considering that physics makes sense.

e. Research evidence of objectives achieved: Students and teachers say so.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: None described.

T. PLANS FOR THE FUTURE: Other projects that are now developing include advanced physics, which, taught to specialists who stay on for a year or two at Grammar Schools, carries them through freshman-sophomore college physics.

A. PROJECT TITLE: NUFFIELD PHYSICAL SCIENCE COURSE

B. PROJECT DIRECTOR: Dr. J. E. Spice, 12 Kingsgate Street, Winchester, Hampshire, England. Tel: Winchester 3561.

C. PROJECT HEADQUARTERS:

a. Address: Same as B above. Contact Project Director.

b. Facilities available for viewing: By previous arrangement with Dr. Spice.

D. PRINCIPAL PROFESSIONAL STAFF: The following members of the physical science group are at present seconded for varying proportions of their time from their full-time appointments as stated: J. E. Spice, Senior Chemistry Master, Winchester College; M. G. Brown, Lecturer in the School of Molecular Sciences, University of Sussex; B. E. Dawson, Lecturer in the Department of Education, King's College, London; A. D. C. Grassie, Lecturer in the School of Mathematical and Physical Sciences, University of Sussex; S. W. Hockey, Senior Physics Master, Marlborough College; I. B. Hopley, Senior Science Master, Clifton College; F. R. McKim, Senior Science Master, Marlborough College.

E. PROJECT SUPPORT: The Nuffield Foundation (headquarters: Nuffield Lodge, Regent's Park, London, N.W. 1) is at present supporting a number of endeavours in the field of science education, under the collective title 'The Nuffield Science Teaching Project'. The headquarters of the Science Teaching Project is at Mary Ward House, 5/7 Tavistock Place, London, W.C. 1, and the overall coordinator is Professor K. W. Keohane.

F. PROJECT HISTORY: The Nuffield Science Teaching Project began work in 1962, with the production of courses in physics, chemistry and biology for the 11-16 age group. In 1964 consideration began to be given to the nature of the courses which should be produced for the 16-18 age group. In May, 1963, Dr. Spice had published an article in The Times Educational Supplement on a combined approach to physical science. In March 1965 the Nuffield Foundation decided to produce four courses for the 16-18 age group--namely, in biology, chemistry, physics and physical science. It was decided to produce the course in physical science (a) because it was felt that this area of science would gain from an integrated approach, rather than being taught under the separate disciplines of chemistry and physics as hitherto; (b) because of the contribution this could make towards reducing the level of specialisation almost universal in English schools for pupils of the 16-18 age range.

G. PRESENT COMMERCIAL AFFILIATIONS: None, except that Penguin Books Limited are to publish the various books and course materials when the trials have been concluded.

H. PURPOSES AND SPECIFIC OBJECTIVES: The aim is to produce an integrated course in physical science, centering around concepts of matter, energy and radiation, and paying particular attention to the relationship between micro-structure and macro-properties.

This course together with mathematics and/or biology will provide the necessary professional qualifications for entry to courses in science, technology, medicine, etc. of all kinds in British universities. One subject, physical science, will replace two subjects, physics and chemistry. There will thus be the opportunity for young people to follow a broader curriculum than hitherto.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Physical Science; Advanced level of the General Certificate of Education; 16-18.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: We shall be grateful if you will confine your requests to papers in whose contents you think you may have a special interest. All of these documents are preliminary drafts.

Progress Reports

1. PR 1 (6-1-66).
2. PR 2 (27-10-66).

'Physical Science' Papers. These have been written mainly by members of the physical science group. They comprise accounts of experimental work, syllabus drafts, reports of meetings, preliminary drafts of course material, etc.

3. PS 11a - Differential Coefficients and Differential Equations from the Results of Trolley Experiments.
4. PS 27 - Electromagnetic Radiation and its Interaction with Matter.
5. PS 30 - Three Experiments on Electrical Capacitance.
6. PS 36 - The Rotation of the Plane of Polarisation of Light by a Magnetic Field.
7. PS 37 - Investigation of the Stoichiometry of Transition Metal Complexes by the Method of Continuous Variation.
8. PS 38 - Electromagnetism (without Flux) in Terms of Interparticle Forces.
9. PS 39 - The Physical Science Course (approximate time allocation for various topics).
10. PS 47 - First Meeting of Physical Science Group with Physicists and Chemists from Trials Schools.
11. PS 48 - Experiments with Alpha-Particles.
12. PS 49 - A Kinetic Study of the Alkaline Fading and Regeneration of Bromophenol Blue.
13. PS 52 - Timing of the work on Interatomic Forces, Structure and Properties.
14. PS 54 - Organic Chemistry.
15. PS 55 - An Introduction to Thermodynamics.
16. PS 56 - The Chemistry of an Element.
17. PS 57 - Comments on PSC Papers.
18. PS 58 - Literature Concerned with the Teaching of Electricity.
19. PS 59 - Second Meeting of the Physical Science Group with Physicists and Chemists from Trials Schools.
20. PS 60 - A Development for Term I.
21. PS 61 - The 'Physical Science' Emphasis of the Initial 'Physics' Section of the Course.

22. PS 62 - Introduction to Potential Energy.
23. PS 64 - An Investigation of the Energy stored in a Charged Capacitor.
24. PS 67 - Analogue Experiments for Optical Activity, using 3 cm Electro-magnetic Waves.
25. PS 68 - Dielectric Constant and Molecular Structure.

'Trials Schools' Papers. These have been written by teachers from the Trials Schools.

26. TS 1 - Two Reactions for the Measurement of Equilibrium (The Hydrolysis of Ethyl Acetate and the Tautomerism of Ethyl Acetoacetate).
27. TS 2 - An Approach to the Exponential Function for the First Year Sixth.
28. TS 3 - a. Simple Apparatus for Conductivity Titrations, and an Iodine Coulometer; b. Dekatron Sealer Unit.
29. TS 4 - Two Uses of the 'Labgear' Scaler D/4151/A.
30. TS 5 - a. Circular Motion Apparatus; b. An Ultrasonic Apparatus for Demonstrating the Properties of Waves.
31. TS 6 - Analysis of Distillation Samples: a. A Refractometer Method; b. A Density Method.

'Physical Science Course' Papers. These form the basis for the actual work in the schools during the first trial, 1966-8. They will be modified in the light of experience, and expanded to form the Teachers' Guide for the second trial, 1967-9.

32. PSC 1, 1a - Gas Laws and Phase Equilibria (Term I).
33. PSC 3 - Basic Chemistry (Terms I and II).
34. PSC 4 - Chemical Equilibrium (Term II).
35. PSC 6 - Electrostatics: Alternative M (Term I).
36. PSC 7 - Atomic Structure and Interatomic Forces (Term II).
37. PSC 8 - Interatomic Forces and Physical Properties (Term II).
38. PSC 9 - Electromagnetism (M) (Terms I and II).
39. PSC 12 - Chemical Kinetics (Term III).
40. PSC 13 - Motion in a Circle, Oscillations, S.H.M., and Wave Motion (Terms III and IV).

PSC papers for the work on mechanics and on the chemistry of the elements in Term I will soon be available, as will papers on the detailed treatment suggested for organic chemistry, electrical oscillations, thermodynamics, and for the study of selected elements in later terms).

K. MATERIALS AVAILABLE FREE: All papers listed in Item J.

L. MATERIALS PURCHASABLE: All materials are at present free.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Not yet known.

O. USE OF PROJECT MATERIALS: Sixteen Schools (listed below) are at present teaching the course. Two teachers, one a chemist and one a physicist are teaching the course in each of these sixteen schools. In about half the schools, both teachers are usually in the classroom at the same time: Atlantic College, St. Donat's

Castle, Llantwit Major, Glamorgan; Bletchley Grammar School, Bletchley, Bucks; Brighton, Hove and Sussex Grammar School, Dyke Road, Hove, 4, Sussex; Cardinal Hinsley Grammar School, Westgate Hill, Tong, Bradford, Yorks; Christ's Hospital, Horsham, Sussex; City of London School for Girls, Carmelite Street, London, E.C.4; Cleveland Grammar School, Warwick Road, Redcar, Yorks; Dauntsey's School, West Lavington, Wilts; Dudley High School, Priory Road, Dudley, Worcs; Eastbourne Grammar School, Eastbourne, Sussex; Elizabeth College, Guernsey; Gordonstoun School, Elgin, Scotland; Marlborough College, Marlborough, Wilts; Seaford College, Petworth, Sussex; Watford Grammar School, Rickmansworth Road, Watford; The College, Winchester.

P. MATERIALS PRESENTLY BEING DEVELOPED:

41. An introduction and guide to the general philosophy of the course.
42. A detailed teachers' guide, which will include information about apparatus, demonstrations and class experiments, and project.
43. A compendium of information for the pupil, issued as loose pages or as a book with tear-out sheets. Such material may include straightforward exposition, experimental directions, reprints of portions of scientific papers, etc.
44. Possibly a book of questions and problems.

Certain other materials may be produced and published, in conjunction with the other Nuffield A-level groups. These may include a book of data, film loops, programmed texts and background readers. The course is being taught at present on the basis of the material listed in item J and certain other papers, although all teachers concerned have already attended 3 three-day discussions. The first draft of the teachers' guide is at present being written, using the aforementioned materials as its basis, but also with reference to current experience in the schools. The first installment of this teachers' guide will be available in May, 1967.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: All the teachers from the existing sixteen trials schools attend a three-day discussion meeting three times a year. Plans have not yet been made for the briefing and training of the teachers from schools who may decide to teach the course in the future.

R. PROJECT EVALUATION: The trials schools are in constant touch with the organiser, and each school is visited by one member of the physical science group each term. The three-day discussion meetings form an essential part of the whole evaluation process.

All pupils taking the course will sit a specially-set 'A-level' examination in June, 1968. This examination is to be administered by one of the eight Examining Boards of England and Wales, on behalf of all the Boards. The examination will be set and marked by two members of the physical science group and by two examiners appointed by the Board. These four examiners are currently giving much attention to the type of examination paper and question which they may ultimately set. There will be no practical examination, but as in all the Nuffield courses laboratory work will be completely integral and essential to the course. Every pupil will carry out a project of some kind towards the end of the course, and the assessment of work for these projects will be taken into account by the examiners. The examiners will also set terminal tests, and will see the papers written for these.

Each school fills in a lesson-by-lesson log of work done. These reports are being collated, so that it can be seen just what emphasis is given to each particular topic by individual schools. This is important, because individual schools are given a good deal of latitude in the way in which they approach the major subdivisions of the course.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: The present operation is scheduled to end in July, 1969. It is hoped that the materials referred to in item J will be published in July 1970. The special A-level examination will be set, at any rate, in 1968, 1969 and 1970.

It is hoped that a further group of schools will begin trials of the course in September 1967, and that more schools will follow suit each successive academic year. If this happens, it is probable that the eight Examining Boards will introduce physical science as an A-level subject according to their own published syllabuses.

A. PROJECT TITLE: PSYCHOLOGY AND MATHEMATICS PROJECT

B. PROJECT DIRECTOR: R. R. Skemp, Psychology Department, The University, Manchester, England.

C. PROJECT HEADQUARTERS:
a. Address: J. S. Friis, Advisory Centre, 33 Horsefair Street, Leicester, England. Contact Dr. Skemp.
b. Facilities available for viewing: Visits to participating schools can be arranged.

D. PRINCIPAL PROFESSIONAL STAFF: R. R. Skemp and J. S. Friis, as above.

E. PROJECT SUPPORT: Leicestershire Education Committee.

F. PROJECT HISTORY:
a. Principal originator: R. R. Skemp.
b. Date and place of initiation: 1964; Leicester, England.
c. Reason for initiation: Dr. Skemp obtained approval from Leicestershire Education Committee to conduct trials in selected areas.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Psychological principles have been applied to make the mathematics more meaningful. It provides a 5-year course to 'O' level.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics; ages 11-16.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
Understanding Mathematics, Vols. I, II, III - by R. R. Skemp, U. L. Press:
1. Pupils' Book.
2. Teachers' Book.
3. Answer Book.

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: Nos. 1, 2 and 3; approximate cost: Pupils' Book, 12/6d; Teachers' Book, 5/0d; Answer Book, 7/6d.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS: No idea, as project has apread outside County of Leicester.

P. MATERIALS PRESENTLY BEING DEVELOPED:
4. Books IV and V.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Area conferences - two per year in Leicestershire.

R. PROJECT EVALUATION:
a. Instruments used: None described.
b. Control groups: None described.

c. Feedback process: Discussion at conferences.
d. Behavioral objectives to be evaluated: None as yet.
e. Research evidence of objectives achieved: None as yet.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: None described.

A. PROJECT TITLE: SCHOOL MATHEMATICS PROJECT (SMP)

B. PROJECT DIRECTOR: Bryan Thwaites, Principal, Westfield College, Hampstead, London N. W. 3, England. Tel: Hampstead 7601.

C. PROJECT HEADQUARTERS:

a. Address: Same as B; also Editorial Office at S.M.P. Office, Marlborough College, Wiltshire. Tel: Marlborough 653. Contact Dr. Thwaites.

b. Facilities available for viewing: Visitors are welcome in any of the schools of the principal authors by arrangement with the Director.

D. PRINCIPAL PROFESSIONAL STAFF: H. Martyn Cundy, Deputy Director; Peter G. Bowie, Editor.

E. PROJECT SUPPORT:

a. Organizational sponsorship: Corporate body by trust deed.

b. Funding agencies: Many different foundations and industries.

F. PROJECT HISTORY:

a. Principal originators: B. Thwaites; T. A. Jones; D. A. Quadling; T. D. Morris; H. M. Cundy.

b. Date and place of initiation: September 1961, Winchester.

c. Reason for initiation: To realize an effective program of reform both of content and method of secondary mathematics teaching based on ideas developed in previous general conferences.

G. PRESENT COMMERCIAL AFFILIATIONS: Texts published by Cambridge University Press - otherwise independent.

H. PURPOSES AND SPECIFIC OBJECTIVES: To create a curriculum for secondary school mathematics which will reflect the nature of modern mathematics and its applications.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics, ages 11-18; O and A levels of G.C.E.; Certificate of Secondary Education.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Annual Director's Report.
2. SMP Book 1, and Teachers' Guide.
3. SMP Book 2, and Teachers' Guide.
4. SMP Book T, and Teachers' Guide.
5. SMP Book T4, and Teachers' Guide.
6. SMP Additional Mathematics Book 1.
7. SMP Elementary Tables.
8. SMP Advanced Tables.
9. SMP East Africa Draft Book 1.
10. SMP East Africa Draft Book 2.
11. "We Built our own Computers".
12. A Winchester Calculus, Vols. 1 and 2.
13. Experimental Texts for Books 3 and 4 (O level).
14. Experimental Texts for Books 6 and 7 (A level).

K. MATERIALS AVAILABLE FREE: No. 1, from Westfield College - see B.

L. MATERIALS PURCHASABLE: All published texts from any bookshop: Nos. 2-8, 11; Experimental texts from The University Bookshop, Southampton, England: Nos. 12-14. Prices are as follows:

2. 18s6d, Teacher's Guide 21s.
3. 18s, Teacher's Guide 21s.
4. 17s6d, Teacher's Guide 21s.
5. 21s, Teacher's Guide 21s.
6. 12s6d.
7. 1s6d.
8. 5s6d.
11. 21s hardback; 12s6d paperback.
12. £1:10s.
13. £1 each book.
14. £1:10s each book.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: English, American version available from Science Research Associates.

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: Over 1,000.
   b. Some specific schools where course is being taught: Apply to Director for names of schools in specific areas.

P. MATERIALS PRESENTLY BEING DEVELOPED:
   15. Advanced Mathematics Books 1-4, based on experimental texts 6 and 7.
   16. Books 4 and 5, based on experimental text 4.
   17. Additional Mathematics Book 2, based on experimental text 5.
   18. Teachers' Guides to every book not already published.
   19. "Further Mathematics" monographs.
   20. Texts for C. S. E.
   21. Further Draft Texts for East Africa, Hong Kong.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Various conferences planned for in-service training throughout the country.

R. PROJECT EVALUATION:
   a. Instruments used: Frequent meetings of author-schoolmasters.
   b. Control groups: No
   c. Feedback process: See a above.
   d. Behavioral objectives identified: No
   e. Research evidence of objectives achieved: Only strong subjective evidence that the materials are found to be excellent.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Formation of SMP of East Africa (local Director, T. D. Morris, P. O. Box 5881, Nairobi, Kenya); Ditchley Conference with representatives from E.S.I.

T. PLANS FOR THE FUTURE: None described.

A. PROJECT TITLE: SHROPSHIRE MATHEMATICS EXPERIMENT (SME)

B. PROJECT DIRECTOR: R. S. Heritage, Cheshire College of Education, Alsager, Shropshire, England. Tel: Alsager 3231.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B. Contact R. S. Heritage.
   b. Facilities available for viewing: School visits.

D. PRINCIPAL PROFESSIONAL STAFF: Director, as above; Advisor: I. R. Vesselo, Penguin Books Ltd., Harmondsworth, Mddx., England; Shropshire County Division: R. D. Price, Shive Hall, Shrewsbury, Shropshire, England.

E. PROJECT SUPPORT: Local Education Authority (Shropshire County Council) assists the schools. The publishers, Penguin Books, Ltd., subsidises the initial issue of texts prior to general publication. No other funds are available.

F. PROJECT HISTORY:
   a. Principal originators: Director, Advisor, Local Authority.
   b. Date and place of initiation: In schools, September 1964; Shropshire County. Meetings are all held in The Technical College in Shrewsbury.
   c. Reason for initiation: Request from a large proportion of the teachers in secondary schools in the county for some kind of curriculum development.

G. PRESENT COMMERCIAL AFFILIATIONS: Penguin Books Ltd. as stated.

H. PURPOSES AND SPECIFIC OBJECTIVES: The improvement of school mathematics for pupils 11 years of age and older. It aims to affect the whole range of abilities in due course. We are working within the traditional syllabus, using new ideas to throw light upon it. As from 1967 we shall develop new lines of thought for a) existing new syllabuses and b) our own new syllabus for public examination. We are at least in part an in-service training scheme for teachers.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Age range - 11-15; 11-16; 11-18 yrs. 1964: Mathematics for General Certificate of Education (Syllabus B or II), O-level; 1967: Mathematics for General Certificate of Education (Syllabus C); 1964: Certificate of Secondary Education (all modes); 1968: G.C.E. A-level; 1967: All levels of ability.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: Texts - "Learning Mathematics":
   1. Book 1 (Test) - Out of print.
   2. Book 1, 1st Ed. - 1965.
   3. Book 1, 2nd Ed. - 1967.
   4. Book 2 (Test) - 1965 (out of print).
   5. Book 2, 1st Ed. - 1967.
   6. Book 3 (Test) - 1966.
   7. Book 4 (Test) - 1967.
   8. Parents' & Teachers' Handbook to Books I-II - 1966.

K. MATERIALS AVAILABLE FREE: None.

L. **MATERIALS PURCHASABLE:** Nos. 2, 3, 5, 6, 7 (9/6d each), and No. 8 (12/6d), from Penguin Books Ltd., Education Dept., Harmondsworth, Middlesex, England.

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** None listed.

O. **USE OF PROJECT MATERIALS:**

a. Number of teachers using materials: Approximately 40 schools in test area (many others elsewhere); approximately 90 teachers.

b. Some specific schools where course is being taught: Shrewsbury Girls High School; Newport Boys Grammar School; Much Weirlock Girls Secondary Modern; Much Weirlock Boys Secondary Modern.

P. **MATERIALS PRESENTLY BEING DEVELOPED:**

9. Book 5 (Test) - 1968.
10. Book 3M (Test) - 1968.
11. Book 4M (Test) - 1969.
12. Teacher's Book for Books 3 and 4 - 1967 or 1968.
13. Teacher's Book for Book 5 - 1969.
14. Teacher's Book for Books 3M and 4M - 1970.
15. Form VI tests - 1968 onwards.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Training programme has been by lectures/discussions which took place weekly for 2-1/2 years from spring 1964. This was introductory material to enable teachers to grasp the significance of what was being done. The members included graduate and non-graduate teachers. Meetings are now held about 7 times per year (at minimum) for a continuation of this. Revision of the texts is continued at each meeting.

R. **PROJECT EVALUATION:**

a. Instruments used: None described.

b. Control groups: We have facilities for these should they be needed in the future.

c. Feedback process: None described.

d. Behavioral objectives identified: None described.

e. Research evidence of objectives achieved: A preliminary test of arithmetical attainment over the period 1964-5 indicated an improvement in 2000 pupils measured against a control of 1000.

f. Other pertinent information: A large scale evaluation will commence in September 1967 in association with the University of Birmingham (England).

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not previously reported.

T. **PLANS FOR THE FUTURE:** Already summarized in publications list. We plan to contact a number of committees on an ad hoc basis for informal discussions of various problems.

A. PROJECT TITLE: ALTERNATIVE SYLLABUSES IN PHYSICS AND CHEMISTRY FOR SECONDARY SCHOOLS*

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: Scottish Education Department. 1962.

C. PROJECT DIRECTOR: None listed.

D. PROJECT HEADQUARTERS ADDRESS: St. Andrew's House, Edinburgh, 1, Scotland.

E. PROFESSIONAL STAFF: A. J. Mee and W. R. Ritchie, H. M. Inspectors of Schools.

F. PROJECT SUPPORT: Scottish Education Department.

G. SPECIFIC PURPOSES AND OBJECTIVES: To modernize science teaching syllabuses in Scottish Secondary Schools; to rationalize the subject matter, and to improve teaching method.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Physics and Chemistry, from ages 12 to 17; to Ordinary and Higher Grade of the Scottish Certificate of Education.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. Syllabuses and Circulars 490 and 512, published by Scottish Education Department.
2. Memoranda for teachers issued by Scottish Education Department.
3. 16mm sound films - "Physics for All", "Introducing Electrovalency"; 8mm cassettes - First year physics. Made by Educational Films of Scotland.
4. Memoranda on testing issued by Scottish Education Department.
5. Report on examinations based on the new syllabuses, 1965. Scottish Certificate of Education Examination Board.
6. Lists of recommended apparatus, by Advisory Committee on Physics.
7. Bulletins on equipment, by Scottish Schools Science Equipment Research Centre.
8. Bulletins issued by local associations of teachers.

J. USE OF PROJECT MATERIALS: All secondary schools in Scotland have now introduced the new syllabuses.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed.

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED:

9. Further memoranda for teachers on physics and chemistry.
10. An additional film.

N. MATERIALS AVAILABLE FREE:

2. Scottish Education Department, St. Andrew's House, Edinburgh 1.
4. Scottish Education Department, St. Andrew's House, Edinburgh 1
5. Scottish Certificate of Education Examination Board, Saughton, Edinburgh, 11.
7. Scottish Schools Science Equipment Research Centre, 103 Broughton Street, Edinburgh, 1.

O. MATERIALS PURCHASABLE:

1. Her Majesty's Stationery Office, Circular 490, 3/6d; Circular 512, 2/6d.
3. Scottish Film Council, 16/17 Woodside Terrace, Glasgow, C. 3.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS. Evaluation has been completed.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: In-service training courses are offered at Moray House, Jordanhill, Dundee and Aberdeen Colleges of Education. These cover method and content. Lectures are given at local science associations.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Not previously reported.

S. PLANS FOR THE FUTURE: A Working Party is preparing a science syllabus for pupils not aiming at the Scottish Certificate of Education. This is now being tried out in 60 pilot schools and the Report is expected in 1967.

*Response made to 1966 Report.

A. PROJECT TITLE: SWANSEA SCHEME

B. PROJECT DIRECTOR: Professor J. D. Weston, Department of Pure Mathematics, University College of Swansea, SWANSEA, Glam., U.K., Tel. Swansea 25678, X334

C. PROJECT HEADQUARTERS:
   a. Address: Same as "B" above.
   b. Facilities available for viewing: None; but arrangements can be made.

D. PRINCIPAL PROFESSIONAL STAFF: J. D. Weston, Professor; M. T. McGregor, Lecturer

E. PROJECT SUPPORT: None

F. PROJECT HISTORY:
   a. Principal originator: Professor J. D. Weston
   b. Date and place of initiation: 1963; Department of Pure Mathematics, University College of Swansea
   c. Reason for initiation: To devise a new Pure Mathematics A-Level syllabus which would reflect the logical accuracy of the subject and introduce the pupil to axiomatic theory.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The chief purpose of the Swansea scheme is to demonstrate that, 'with suitable presentation, topics can be treated with logical accuracy in the sixth form to a far greater extent than is usual at present, and consequently that pupils can be given a better understanding of the nature of mathematics than has hitherto been possible'.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Pure Mathematics, A-level, 16-18 years

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Alternative syllabus for Pure Mathematics at Advanced level.
   2. Outline of an introductory course in Analysis, Part 1.
   3. Outline of an introductory course in Analysis, Part 2.
   4. Exercises in elementary Pure Mathematics, First collection. This collection contains 50 exercises.
   5. Exercises in elementary Pure Mathematics, Second collection. This also contains 50 exercises.
   6. Solutions and comments on the First collection of exercises.
   7. Notes on the circular functions, second edition.

K. MATERIALS AVAILABLE FREE: 1 of Section "J" and 2-7 for active participants in the scheme. Source: Department of Pure Mathematics, University College of Swansea.

L. MATERIALS PURCHASABLE: Item 7 at a cost of 3s.0d. Source: The Bookshop, University College of Swansea, SWANSEA, Glam., U. K.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Approximately 40

b. Some specific schools where course is being taught: Amman Valley Grammar School, Ammanford; Bishop Gore Grammar School, Swansea.

P. MATERIALS PRESENTLY BEING DEVELOPED: Further exercises and notes on them.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Two study groups have been initiated; one group meets in the Department of Pure Mathematics, University College of Swansea, the other at Trinity College, Carmarthen. Members of each study group receive careful instruction on the presentation and content of the alternative syllabus.

R. PROJECT EVALUATION:

a. Instruments used: None

b. Control groups: Not in a formal sense.

c. Feedback process: None described

d. Behavioral objectives identified: Yes

e. Research evidence of objectives achieved: Examination results, teachers' reports, university performance of pupils.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The two study groups have continued with their meetings.

T. PLANS FOR THE FUTURE: The study groups will continue to meet regularly, and it is envisaged that a number of schools will, in the near future, participate more fully in the scheme and present candidates for examination on the alternative syllabus.

A. PROJECT TITLE: ENSEÑANZA DE CIENCIAS--(SCIENCE TEACHING)

B. PROJECT DIRECTOR: Mesías Huaringa Ricci, Misión de la Unesco, 4a Ave. Nº 124, Tegucigalpa, Honduras. Cable: Hondunesco. Tel: 2-8586.

C. PROJECT HEADQUARTERS: UNESCO, Place de Fontenoy, Paris 7e, France.

D. PRINCIPAL PROFESSIONAL STAFF: None described.

E. PROJECT SUPPORT: UNESCO.

F. PROJECT HISTORY:
  a. Principal originator: Mesías Huaringa Ricci.
  b. Date and place of initiation: 1962; Tegucigalpa, Honduras.
  c. Reason for initiation: The Honduran Government asked for help in this area.

G. PRESENT COMMERCIAL AFFILIATIONS: None described.

H. PURPOSES AND SPECIFIC OBJECTIVES: To organize physics laboratories using inexpensive apparatus or apparatus built from scrap material at the secondary level to be used by students and at the elementar level by the teachers.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Physics and Chemistry at the secondary level; 15-18 year-olds. Physics, Biology and Mathematics at the primary level, for teachers.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: Materials for secondary and primary levels have been produced.

K. MATERIALS AVAILABLE FREE: Easily constructed materials.

L. MATERIALS PURCHASABLE: An equipment list is available from Fisher and Vellvé.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Spanish

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None described.

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: 28 (14 lab assistants and 14 teachers) in Honduras, 5 in El Salvador, and 2 in Nicaragua
  b. Some specific schools where course is being taught: In 14 high schools in Honduras; 1 in El Salvador; and 1 in Nicaragua.

P. MATERIALS PRESENTLY BEING DEVELOPED: None described.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A seminar on new methods for physics teaching: it will be offered in Tegucigalpa, Honduras November and December 1967. The subject matter covered will be: programmed instruction, construction of new equipment, etc.

R. PROJECT EVALUATION: The only evaluation is feedback from observing the reactions of students and teachers who ask for, demand or buy the equipment to install laboratories in their respective schools. There are now 14 schools which own the material for the primary and secondary levels. Help in obtaining the material has been received from UNESCO, USAID and the Institutes.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: This project, begun in Honduras, will spread to all of Centro America.

A. PROJECT TITLE: CURRICULUM PROJECT FOR SPECIAL CLASSES IN CHEMISTRY AND PHYSICS (BIOLOGY), SECONDARY SCHOOL, FOURTH GRADE. (THE FIRST THREE GRADES USE THE SAME CURRICULA AS NORMAL SECONDARY SCHOOLS.)*

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: Ministry of Education. March 1966.

C. PROJECT DIRECTOR: Karoly Garami

D. PROJECT HEADQUARTERS ADDRESS: National Institute of Pedagogy, 17 Gorkij fasor, Budapest VII, Hungary.

E. PROFESSIONAL STAFF: Karoly Garami, Head of the Department of Chemistry, N.I.P.; Géza Tóth, Research Worker of the Department of Chemistry, N.I.P. Their work is aided by a commission of eight teachers from universities and secondary schools.

F. PROJECT SUPPORT: Ministry of Education

G. SPECIFIC PURPOSES AND OBJECTIVES: Evolving a level of knowledge, deeper and more expansive that it is general.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Formation of modern rudiments in physico-chemistry. Preparation for the final examination (maturity) of special secondary school classes.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: For the present:
1. Stencilled topic of debate for an extensive conference, April 1966.
2. Typewritten draft for discussion in an exclusive commission, May 1966.

J. USE OF PROJECT MATERIALS: Project material is not used in schools at the present time. It will be initiated at four schools in September 1966, and used at 21 schools in 1967. This is because chemistry is not taught in the fourth grade of normal classes, and special classes will develop gradually.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Hungarian

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED:
3. Experimental textbook (stencilled), ready by September 1966.
4. Experimental textbook, revised, in rotaprint, ready by September 1967.

N. MATERIALS AVAILABLE FREE: No. 3 - available from the National Institute of Pedagogy in the next school year.

O. MATERIALS PURCHASABLE: No. 4 - Educational Publishing Company (on behalf of the Ministry of Education) at a price fixed later.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Material will be evaluated by direct and indirect observations, by conferences of teachers using the program, and by test papers.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Teachers of the special classes can prepare for their tasks on the basis of the general plan for extension training. Forms of extension training are: Individual study, conferences for working parties (in towns), two or three common discussions in counties and towns.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Not previously reported

S. PLANS FOR THE FUTURE: Decision about the adoption of project will be made by the Ministry of Education on August 1, 1966.

*Response made for 1966 Report

A. PROJECT TITLE: OPI MATHEMATICAL REFORM PROJECT* (NOT AN OFFICIAL TITLE)

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: T. Varga. 1961

C. PROJECT DIRECTOR: No such function

D. PROJECT HEADQUARTERS ADDRESS: National Institute of Pedagogy, Chair of Mathematics, Budapest VII, Gorkij fasor 17-21, Hungary.

E. PROFESSIONAL STAFF: A. Cser, Head of the Chair of Mathematics; P. Gádor; S. Páiffy; T. Varga

F. PROJECT SUPPORT: National Institute of Pedagogy and Ministry of Education, Hungary

G. SPECIFIC PURPOSES AND OBJECTIVES: To develop a mathematical curriculum for mass education; To Develop a mathematical curriculum for gifted pupils. Both are for grade levels K through 12.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: The subject is "mathematics as a whole". In traditional terms (gradually losing or changing their meaning): Topics in arithmetic, algebra, geometry (plane and solid, synthetic and analytic), trigonometry and topics of "higher mathematics" (such as sets, logic, groups and other algebraic structures, topology, calculus, probability, statistics, information theory, game theory, mathematics for computers, etc.) are being integrated and gradually developed from elementary toward more sophisticated ideas and skills. Grade levels where effective classroom work was in progress in 1965-66; grades 1 and 3.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: Worksheets, Instructions for teachers (only preliminary versions).

J. USE OF PROJECT MATERIALS: Two teachers are using the complete program and an additional teacher is using some of the materials. Specific schools where the material is used: Budapest, V. Vaci utca 43. altalanos iskola; Budapest VIII. Jazmin utca 6. altalanos iskola

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Hungarian

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: Further worksheets and teacher instructions.

N. MATERIALS AVAILABLE FREE: None listed

O. MATERIALS PURCHASABLE: None listed

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Preliminary versions of worksheets are sometimes tested with a small sample of pupils before presenting them to a whole class, especially if doubts emerge on the part of the project staff. Worksheets are periodically revised. Towards the end of each year project classes are tested along with "normal" classes: (a) parallel classes, through tests based on traditional material and (b) classes of higher grade level where similar material is being taught as in project classes.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Summer courses and in-service courses during the school year are planned. Also, further materials for teachers.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Not previously reported

S. PLANS FOR THE FUTURE: To develop the curriculum for further grade levels; To revise materials; To extend the work to further classes, especially to pupils of different ability groups and schools in different social environments, and to transfer some ideas and results to mass education.

*Response made for 1966 Report

A. PROJECT TITLE: EXPERIMENTAL PROJECT ON TEACHING OF SCIENCE AND MATHEMATICS AT THE MIDDLE SCHOOL STAGE.

B. PROJECT DIRECTOR: Dr. R. N. Rai, Head of the Department, Department of Science Education, National Council of Educational Research & Training, N.I.E. Bldgs. Mehrauli Road, New Delhi 16, India, Tel. 77601, 78498

C. PROJECT HEADQUARTERS:
a. Address: Same as "B"; Contact: Dr. M. C. Pant, Professor of Science Education
b. Facilities available for viewing: A visit to the Central Science Workshop of the Department developing new science equipment for the use under the project, a visit to the experimental schools and the demonstration school and examination of the printed instructional materials.

D. PRINCIPAL PROFESSIONAL STAFF: Physics: R. N. Rai, Head of Department; V. N. Wanchoo and N. Mittra, Readers; K. J. Khurana, Research Officer; H. L. Sharma, Sr. Research Assistant; Rameshwar Dayal, Technical Assistant; Chemistry: M. C. Pant, Professor; N.K. Sanyal, Field Adviser; C. Radhakrishnan and K. C. Mathur, Readers; K. S. Bhandari, Research Officer; B. S. Aggarwal, Technical Officer; Mathematics: R. C. Sharma, Sr. Research Officer; S. N. Kaul, Reader; P. S. Mahajan, Research Assistant; B. P. Pande, Technical Assistant; Workshop & Equipment: D. S. Rao, Head of the Central Workshop; A. P. Verma, Engineer; UNESCO Experts Working on the Project: S. V. Nazariev, Head of the Team; A. V. Griukhanov, Physics; V. A. Glushenkov, Chemistry; V. I. Michine, Mathematics; I. D. Zverev, Biology and Teacher Training; I. S. Makalov, Biology; V. N. Smirnov, Engineer; G. A. Protasovsky, Equipment designer.

E. PROJECT SUPPORT: National Council of Educational Research & Training, New Delhi and UNESCO.

F. PROJECT HISTORY:
a. Principal originators: Department of Science Education, National Council of Educational Research & Training, New Delhi.
b. Date and place of initiation: September 1965; Delhi
c. Reason for initiation: To undertake a pilot study for developing curricular materials for an improved science and mathematics instruction at the middle stage of the secondary school as recommended by the UNESCO Planning Mission.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The general science approach to the teaching of science which is at present followed at the middle school stage of Indian schools has not proved successful due to a number of reasons. The standards of attainment at the end of the secondary school in science and mathematics subjects has remained rather low as compared to the developed countries. With a view to remedy the above defects and to achieve higher standards of science and mathematics instruction at the secondary stage, a new programme of teaching science as individual disciplines has been attempted under this project: To develop a compulsory course of science and mathematics for all the students at the middle stage of school education; To Develop a new syllabi, text materials, teachers' guide, laboratory experiments and equipment for teaching science as individual disciplines of physics, chemistry, biology and mathematics from the very beginning of the middle stage of school education instead of the present programme of teaching science as an integrated course of "General Science"; To develop a complete package programme covering the students text material, curriculum guide, teachers' guide, equipment and laboratory instructions and audio-visual aids; To develop materials for short-term training/refresher courses for teachers to teach effectively the new materials and to conduct pilot training courses.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Biology, Chemistry, Mathematics, Physics; Grades VI - VIII; Age Levels 12 - 14.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Text material in Arithmetic and Algebra for Class VI (Hindi edition) Code no. DSE-Exp. I)
2. Text material in Arithmetic and Algebra for class VI (English edition) (Code No. DSE-Exp. 2)
3. Text material in physics for class VI (Hindi edition) (Code No. DSE-Exp. 3)
4. Text material in physics for class VI (English edition) (Code No. DSE-Exp. 4)
5. Text material in Biology for class VI (Hindi edition) (Code No. DSE-Exp. 5)
6. Text material in Biology for Class VI (English edition) (Code No. DSE-Exp. 6)
7. Text material in Geometry for class VI (Hindi edition) (Code No. DSE-Exp. 7)
8. Text material in Geometry for class VI (English edition) (Code No. DSE-Exp. 8)
9. Text material in Chemistry for class VII (Hindi edition) (Code No. DSE-Exp. 9)

K. MATERIALS AVAILABLE FREE: Limited copies of all the above publications can be obtained from the Project Headquarters.

L. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Hindi and English

M. MATERIALS PURCHASABLE: Priced text and other instructional materials will be available after July 1967 from the Project Headquarters.

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: It is expected that the different State Governments might like to adapt these materials and translate them in their regional languages.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: About 75 teachers
b. Some specific schools where course is being taught: 31 schools in Delhi.

P. MATERIALS PRESENTLY BEING DEVELOPED:

7. Curriculum guide in Biology, Physics, Mathematics for class VI
8. Teachers' guide for class VI textbooks in Biology, Mathematics and Physics.
9. Curriculum guide for class VII textbook in Chemistry
10. Teachers' guide for class VII textbook in Chemistry
11. Textbook in Physics for class VII and VIII
12. Testbook in Biology for class VII and VIII
13. Textbooks in Mathematics for class VII and VIII
14. Textbook in Chemistry for class VIII
15. Curriculum guides and teachers guides for each of the above.
16. Syllabus for the subjects of Physics, Chemistry, Biology and Mathematics for classes VI to VII

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A four-week training programme for the teachers of the selected experimental schools was held in May 1966 at the Department of Science Education, National Council of Educational Research & Training, New Delhi. It is proposed to continue such summer programmes specially with a view to develop printed materials which can be used by other centres for conducting similar training programmes; Holding of one-day meeting each month for the participating teachers at the Project Headquarters at Delhi.

R. PROJECT EVALUATION:

a. Instruments used: Text materials were evaluated by a seminar of participating and non-participating teachers of the local secondary schools; Monthly, half yearly and annual examination of the pupils studying under the Experimental Project; Visits to the experimental schools by the teams of the officers of the Department and monthly meetings of the departmental officers with the teachers of the experimental schools.
b. Control groups: No
c. Feedback process: The monthly meetings, seminars and visits to the schools are used to obtain the feedback from the teachers of the project schools.
d. Behavioral objectives identified: No
e. Research evidence of objectives achieved: The evaluation of the project has yet to be taken up as a separate research study.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported

T. PLANS FOR THE FUTURE: The Project will be extended to cover classes VII and VIII in the experimental schools and more institutions will be taken up for extended trial of the materials in institutions located in various States of the country.

A. PROJECT TITLE: NATIONAL SCIENCE TALENT SEARCH SCHEME (NSTS)

B. PROJECT DIRECTOR: Dr. K. N. Saxena, Field Adviser, National Council of Educational Research and Training, Mehrauli Road, New Delhi 16, India, Tel. 77621.

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above; Contact: Dr. K. N. Saxena
b. Facilities available for viewing: Aptitude tests; publications; research reports on the analysis of data; group discussions and individual discussions.

D. PRINCIPAL PROFESSIONAL STAFF: R. N. Rai, Head, Department of Science Education, N.C.E.R.T.; K. N. Saxena, Field Adviser, N.C.E.R.T., New Delhi; Ved Ratan, Research Associate; Tara Chand, Section Officer

E. PROJECT SUPPORT:
a. Organizational sponsorship: National Council of Educational Research and Training, New Delhi (N.C.E.R.T.)
b. Funding agency: Ministry of Education, Government of India, New Delhi

F. PROJECT HISTORY:
a. Principal originator: K. N. Saxena
b. Date and place of initiation: December 1962; New Delhi
c. Reason for initiation: To create a band of scientists in India, by India and for India

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The project has been running for the last 4 years. The Objectives are: to identify brilliant students at the end of the secondary school stage who possess an aptitude for science; to award these selected students scholarships from B.Sc. I year up to the Ph.D stage (9 years approximately); to nurture the talents through summer schools, individual attention, etc.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Eleventh class of a higher secondary school is the grade at which the selection is made. The age level is between 15 to 17+. The students must have science and mathematics as major subjects.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Science Aptitude Tests (1963 to 1967) - objective type items on 14 branches of sciences. (Printed copies available)
2. Essay paper (1963 to 1967) - only scientific topics (Printed)
3. Project Reports - on scientific subjects (Printed)
4. Research report - statistical analysis of data 1963,1964,1965
5. Essays and Project Reports by young scientists

K. MATERIALS AVAILABLE FREE: Items 1 to 5 available from: Dr. K. N. Saxena, Field Adviser, National Council of Educational Research and Training, N.I.E. Buildings, Mehrauli Road, New Delhi 16, India

L. MATERIALS PURCHASABLE: All are free of cost.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Hindi and other Indian languages

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Over ten thousand

b. Some specific schools where course is being taught: The tests are administered at 350 centers in India. Interviews are held at 5 or 6 centers in India. Summer Schools for selected scholars are held at 15 to 20 centers in India.

P. MATERIALS PRESENTLY BEING DEVELOPED:

6. Statistical research report 1966 and 1967
7. Essay and project reports by young scientists 1966 and 1967
8. Some followed-up case studies

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Seminars for teachers are held all over India on "Identification and fostering of scientific talents". Follow-up studies are conducted with the help of technical staff and the teachers at the College and University levels.

R. PROJECT EVALUATION:

a. Instruments used: Science Aptitude Test; Essay Paper; Project Report; Interview

b. Control groups: Yes, for research purposes only

c. Feedback process: The evaluative tools are supplied to the teachers for the improvement in the overall system of examinations. Research data are available for sharpening the tools of selection.

d. Behavioral objectives identified: Yes

e. Research evidence of objectives achieved: The research reports of 1963, 1964, and 1965 especially the studies on empirical and predictive validities.

f. Other pertinent information: The whole scheme has been thoroughly revised from time to time on the basis of the research conducted year after year.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The examination for searching scientific talents was held all over the country at the end of the secondary stage of education. The selected candidates are awarded scholarships from B.Sc. 1st year to Ph.D. degree. Summer schools were held for selected scholars of 1963, 1964 and 1965. Research reports were prepared on 1965 data.

T. PLANS FOR THE FUTURE: All India Talent Search Examination, January 1967; Announcements of Awards, May 1967; Placement of scholars at selected universities 1967; Follow-up studies of previous and present scholars; Organization of 15 summer schools for science Talent Search scholars of 1963, 1964, 1965, 1966.

A. PROJECT TITLE: ADAPTATION OF THE BSCS YELLOW VERSION FOR USE IN HIGH SCHOOLS IN ISRAEL

B. PROJECT DIRECTORS: Prof. Alexandra Poljakoff-Mayber and Dr. E. Jungwirth, The Hebrew University of Jerusalem, Israel

C. PROJECT HEADQUARTERS: Ministry of Education and Culture, Government of Israel, Contact: Professor A. Poljakoff-Mayber

D. PRINCIPAL PROFESSIONAL STAFF: Alexandra Poljakoff-Mayber, Plant Physiologist; E. Jungwirth, Educator and Testing Specialist; Z. Lev, M. Chor and A. Barasch, Inspectors; H. Hadomi and J. Feuchtwanger, Teachers' supervisors in the field

E. PROJECT SUPPORT:

a. Organizational sponsorships: The School of Education, Hebrew University of Jerusalem; The Department of Education, Bar-Ilan University; The Ministry of Education and Culture, Government of Israel.

b. Funding agencies: Ministry of Education, Government of Israel; Ministry of Health, Education and Welfare; U.S.A. Government (under P.L. 480)

F. PROJECT HISTORY:

a. Principal originator: The Ministry of Education, Government of Israel

b. Date and place of initiation: 1963; Israel

c. Reason for initiation: The need for innovation of the Biology Curriculum in the High Schools of Israel

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: None described

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Biology for the 9th and 10th grades in the Academic, and Agricultural Schools

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

Biology the life science: I and II Unity
III Diversity (Microorganisms)
IV Diversity (Plants)
V Diversity (Animals)

K. MATERIALS AVAILABLE FREE: All the five items listed under J are available from Mr. M. Cohen, The Ministry of Education, Main Office, Jerusalem, Israel.

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: The original is the American BSCS Yellow Version in English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: It has been adapted and published in Hebrew

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 50

b. Some specific schools where course is being taught: Academic and Agricultural High Schools, as well as the schools in the Kibbutzim (Agricultural settlements)

P. **MATERIALS PRESENTLY BEING DEVELOPED:** The continuation of the BSCS Yellow Version: Diversity (Animals), Continuity

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Summer courses and one-day meetings once a month in the Hebrew University of Jerusalem and the Bar-Ilan University at Ramat-Gan.

R. **PROJECT EVALUATION:**

a. Instruments used: Tests and observation by Teachers' supervisors

b. Control groups: Yes

c. Feedback process: Records kept by the teachers. Records kept by the supervisors and the tests all serve as a feedback material which is analyzed and will serve as a basis for revision of the program.

d. Behavioral objectives identified: To serve as part of the feedback system, i.e. to produce information as regards teaching efficiency (as measured by student achievement) on key points of the text; To serve as evaluation of the BSCS method as such, as well as contrasted with orthodox methods of biology-teaching.

e. Research evidence of objectives achieved: None yet, as we are at the beginning of the field trial.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not previously reported

T. **PLANS FOR THE FUTURE:** None described

A. PROJECT TITLE: EXPERIMENTAL CHEMISTRY PROGRAMME FOR SECONDARY SCHOOLS

B. PROJECT DIRECTOR: Professor D. Samuel, Isotope Dept., Weizmann Institute of Science, Rehovoth, Israel, Tel. 951-721, X411

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above.
b. Facilities available for viewing: Experimental classes using programme materials.

D. PRINCIPAL PROFESSIONAL STAFF: D. Samuel; F. Klein (Scientific Editor); S. Novick (Coordinator); Z. Karp.

E. PROJECT SUPPORT:
a. Organizational sponsorships: Weizmann Institute of Science; Israel Ministry of Education
b. Funding agency: Israel Ministry of Education

F. PROJECT HISTORY:
a. Principal originators: Committee for the Promotion of the Teaching of Chemistry in Secondary Schools, originally a subcommittee set up by Ministry of Education under chairmanship of Prof. A. de-Shalit
b. Date and place of initiation: 1965; Rehovoth, Israel
c. Reason for initiation: Need for introducing modern curricula into Israeli High Schools

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Basic experimental programme consists of Hebrew translation of "CHEM Study" text and lab. manual, to which will be added specially written Chapters on Organic Chemistry and selected topics in Chemistry (such as Industrial processes). The programme will then be revised as a result of experience in Pilot project, feedback analysis and success of new curricula in other sciences.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Chemistry, Grades 10 to 12 (15 - 18 year olds)

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Text - Part I (Chem Study Chapters 1-3, 11)
2. Laboratory Manual (Part I)

K. MATERIALS AVAILABLE FREE: 1. Text; 2. Lab. Manual (Part I)

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Hebrew

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: 15
b. Some specific schools where course is being taught: Herzliyah H.S.; Rehovoth H.S.; Rishon-Le-Zion H.S.; Kfar Yarok Agricultural H.S.; Municipal H.S. "DALED", Tel-Aviv; Pardess Hannah Agricultural

H.S.; Kibbutz Maoz Hayim H.S.; Kibbutz Kabri H.S.; Bnei Akiva Yeshiva, H.S.

P. MATERIALS PRESENTLY BEING DEVELOPED:
3. Text - Part II (Chem Study Translation)
4. Lab. Manual - Part II
5. Selected Chapters in Organic Chemistry

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: University-based Summer Institute (location not yet specified)

R. PROJECT EVALUATION:
a. Instruments used: Detailed Feedback Reports
b. Control groups: None
c. Feedback process: Weekly reports from teachers - filed by chapters; Monthly evaluation and discussion meeting of all teachers on Pilot Project.
d. Behavioral objectives identified: None described
e. Research evidence of objectives achieved: None described

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not reported

T. PLANS FOR THE FUTURE: Completion of 3-year Pilot Project (by 1968); Development of 1-year curriculum for non-science majors (1967-68); Revision of 3-year programme (1968-1969).

A. **PROJECT TITLE:** THE TEACHING OF MATHEMATICS IN HIGH SCHOOLS

B. **PROJECT DIRECTORS:** Prof. S. A. Amitsur, Department of Mathematics, Hebrew University, Jerusalem, Israel; Mr. M. Marcus, Ministry of Education, High School Department, Shivtey Israel Str., Jerusalem, Israel.

C. **PROJECT HEADQUARTERS:**
   a. Address: Same as "B" above.
   b. Facilities available for viewing: None

D. **PRINCIPAL PROFESSIONAL STAFF:** University and High School teachers grouped together to suit each purpose.

E. **PROJECT SUPPORT:** Ministry of Education, Israel

F. **PROJECT HISTORY:**
   a. Principal originator: S. A. Amitsur
   b. Date and place of initiation: 1958; Jerusalem, Israel
   c. Reason for initiation: None described.

G. **PRESENT COMMERCIAL AFFILIATIONS:** None

H. **PURPOSES AND SPECIFIC OBJECTIVES:** Revision of high school curriculum in Math.: Special features which differ from other projects are in algebra: Translation into algebraic language is developed independently of the technique of solving equations; in calculus: derivation is introduced by linear approximation and a stepwise introduction of the quantifiers in defining the o(1). Axiomatization is introduced in the developing of the elementary functions and integrals. Analytic geometry, as such, is introduced very early.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** Algebra: grades 9-10 ages 14-15; Calculus: grades 11-12 ages 16-17; Probability and Statistics: as above; A chapter in the Foundation of Mathematics: grade 12, age 17.

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:**
   1. Algebra I. (grade 9-10) written by Mr. A. Erlich
   2. Algebra II. (grade 10) written by Mr. A. Erlich
   3. Chapters in (analytic) Geometry, Edited by Mr. A. Erlich
   4. Differential Calculus, written by Mr. Kollber
   5. Probability and Statistics, written by Professor Posner

K. **MATERIALS AVAILABLE FREE:** None

L. **MATERIALS PURCHASABLE:** The material is distributed only to the schools participating in the experimentation. For other purposes contact Mr. M. Marcus, (Inspector) High School Department, Ministry of Education, Jerusalem, Israel.

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** Hebrew

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** None

O. **USE OF PROJECT MATERIALS:** About 100 classes in 8 schools in an area around the city Tel-Aviv.

P. MATERIALS PRESENTLY BEING DEVELOPED: Revision of Algebra I, II; Integral Calculus; Chapters in the Foundation of Mathematics.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Summer seminars

R. PROJECT EVALUATION:

a. Instruments used: None yet

b. Control groups: None

c. Feedback process: Meetings, once a month with all the teachers. Monthly visits in classes.

d. Behavioral objectives identified: The motivation of a need for looking for a solution of a problem for introducing Translation into Algebra is replaced by the natural interest of children in translations technique.

e. Research evidence of objectives achieved: None yet

f. Other pertinent information: Our plan is to work with a few schools and only after a period of testing and re-evaluating of the material will new schools be allowed to join in the teaching of the new material and this only after the teachers of the schools will pass some preparation.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: None described.

A. PROJECT TITLE: **PROJECT FOR A MODERN TEACHING OF CHEMISTRY IN SECONDARY SCHOOLS***

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: OECD and Italian Ministry of Public Instruction. October 1962.

C. PROJECT DIRECTOR: Arnaldo Liberti, Head, Analytical Department, School of Chemistry, University of Naples

D. PROJECT HEADQUARTERS ADDRESS: Instituto Chimico-Universita Napoli - Via Mezzocannone 4, Napoli

E. PROFESSIONAL STAFF: P. Pino, University of Pisa; A. Fava, University of Pisa; G. Illuminati, University of Roma

F. PROJECT SUPPORT: OECD (European Organization for Cooperation and Development), Paris; Italian Ministry of Public Instruction, Roma

G. SPECIFIC PURPOSES AND OBJECTIVES: To establish a number of pilot classes for the teaching of chemistry according to modern didactic criteria; to modernize the teaching of chemistry in secondary schools; and to emphasize the experimental approach.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Chemistry - Secondary level

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. Lessons of Chemistry
2. Manual of Experiment, for the Lessons of Chemistry
3. Guide for teaching through experiment

J. USE OF PROJECT MATERIALS: 100 teachers are using complete program, and 50 others are using some of the materials. Schools where the materials are being used: Liceo Umberto, Napoli; Liceo Vittorio, Veneto, Milano.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Italian

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: A new manual of experiments.

N. MATERIALS AVAILABLE FREE: None listed

O. MATERIALS PURCHASABLE. The books indicated in I at a nominal cost

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: National tests are carried on, which are classified by the national committee.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The new teaching method is tried in pilot classes; experimenta are extended in order to increase the number of teachers and of classes.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Not previously reported

S. PLANS FOR THE FUTURE: To develop a new syllabus for Italian high schools

*Response made for 1966 Report

A. PROJECT TITLE: PROJECT FOR A MODERN TEACHING OF MATHEMATICS IN SECONDARY SCHOOLS

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: OECD and Italian Ministry of Public Instruction. October 1961.

C. PROJECT DIRECTOR: Prof. Mario Villa; Ord. Prof. and Director of Institute of Geometry of University of Bologna, Italy

D. PROJECT HEADQUARTERS ADDRESS: Instituto di Geometria dell'Universita di Bologna, Piazza Porta S. Donato, 5 - Bologna, Italy

E. PROFESSIONAL STAFF: M. Baldassarrit, University of Padova; P. Buzano, Politecnico of Torino; L. Campedelli, University of Florence; E. Castelnuovo of Secondary School "T. Tasso" of Rome; L. Daboni, University of Trieste; G. Evangelisti, University of Bologna; U. Morin, University of Padova; G. Ricci, University of Milan; T. Viola, University of Torino.

F. PROJECT SUPPORT: OECD (European Organization for Cooperation and Development), Paris; Italian Ministry of Public Instruction, Roma.

G. SPECIFIC PURPOSES AND OBJECTIVES: To establish a number of pilot classes for the teaching of mathematics according to modern didactic criteria; to modernize the teaching of mathematics in secondary schools.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Mathematics - Secondary level.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: The following books have been prepared for the professors and students of the pilot classes:
1. "Per un insegnamento moderno della matematica nelle Scuole secondarie", 1962
2. "Per un insegnamento moderno della matematica nei Licei classici, nei Licei scientifici e negli Instituti magistrali, 1963
3. "Per un insegnamento moderno della matematica negli Instituti tecnici", 1963
4. "Per un insegnamento moderno della matematica negli Instituti tecnici", 1964
5. "Per un insegnamento moderno della matematica nella Scuola media", 1964

J. USE OF PROJECT MATERIALS: The Ministry of Public Instruction has instituted pilot classes in a large number of Secondary Schools situated in all the regions of Italy

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Italian

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: None

N. MATERIALS AVAILABLE FREE: Books indicated in I for students and professors of pilot classes.

O. MATERIALS PURCHASABLE: "Matematica moderna nella Scuola media", Publ. Patron, Bologna, 1965; "Matematica moderna nelle Scuole secondarie superiori", Publ. Patron, Bologna, 1966.

P. **SPECIFIC PLANS FOR EVALUATION OF MATERIALS:** National Committee nominated by the Ministry for Public Instruction.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Characteristic arguments and aspects of the program of mathematics relative to the experiment are: set theory, modern algebra, elementary geometric transformations, an ample development of the analytic geometry introduced from the first classes. Other arguments, according to the type of School, were added to these. Experiments are extended in order to increase the number of teachers and of classes.

R. **PROJECT ACTIVITIES SINCE MARCH 1965 REPORT:** Not previously reported

S. **PLANS FOR THE FUTURE:** To continue the experiments and the preparation of the mathematic teachers in secondary shcools until the forseen reform of the mathematical teaching programs in the secondary Italian schools.

A. PROJECT TITLE: PSSC PILOT EXPERIMENT

B. PROJECT DIRECTOR: G. Puppi, Instituto di Fisica dell'Universita, Via Irnerio, 46 - Bologna, Italy. Tel: 260991.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B. Contact Mrs. Maria Ferretti, Secretary of the Commissione Nazionale per le Classi Pilota in Fisica.
   b. Facilities available for viewing: Visits to schools in some towns all over the country; visit (on short notice) to the technical school in Bologna where PSSC kits were duplicated, and their workshops.

D. PRINCIPAL PROFESSIONAL STAFF: All the staff, on a voluntary basis has worked for only part-time on the project. There is not a proper "staff"; only qualified collaborators.

E. PROJECT SUPPORT:
   a. Organizational sponsorship: Physics Department, University of Bologna.
   b. Funding agencies: Italian Ministry of Education and OECD.

F. PROJECT HISTORY:
   a. Principal originators: OECD and Italian Ministry of Education.
   b. Date and place of initiation: October 1961; Bologna.
   c. Reason for initiation: Study of a practical way of improving the teaching of physics in secondary schools.

G. PRESENT COMMERCIAL AFFILIATIONS: Esso Standard Italiana, P.le dell'Industria, N. 46 - Roma, for the Italian version of films; Zanichelli Publisher, Via Irnerio 34, Bologna, for the translation of the books.

H. PURPOSES AND SPECIFIC OBJECTIVES: The improvement of physics teaching in secondary schools. This is the only project existing for physics teaching in Italy.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Physics taught in 2 or 3 years, for III, IV, V, grades of the "Liceo scientifico", or for II, III grades of the "Liceo classico" (up to 19 years), or for II and III grades of "Instituto Magistrale" up to 18 years.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Italian version of "Physics" of PSSC I ed. (2 volumes);
   2. Italian version of Laboratory Guide I ed. (2 volumes);
   3. Italian version of Teachers' Research Book and Guide - I ed. (4 volumes);
   4. Italian version of the PSSC kits.
   5. Italian version of about 30 PSSC films.
   6. Notiziario sui corsi pilota in fisica (Newsletter).

K. MATERIALS AVAILABLE FREE: No. 6 - from Casa Editrice Zanichelli, Via Irnerio 34- Bologna, Italy.

L. MATERIALS PURCHASABLE:
   1. "Fisica" I e II, Ed. Zanichelli - Price Lit. 2.300.= (each volume).

2. Guida al Laboratorio di Fisica, Ed. Zanichelli: Lit. 750.= (1st part); Lit. 750.= (2nd part).
3. Teachers' Guide, Ed. Zanichelli: Lit. 10.000.= (for the 4 volumes).
4. Italian version of the PSSC Kits - Istituto Aldini Valeriani Via Castiglione 40 - Bologna - Lit. 100.000.=
5. Italian version of the PSSC films - Esso Italiana (special non-profit prices for schools).

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Italian

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None described.

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: About 200.
b. Some specific schools where course is being taught: Liceo Classico - Liceo Scientifico - Istituto Magistrale (also a trial in the Istituti tecnici.)

P. MATERIALS PRESENTLY BEING DEVELOPED: None

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A four-week institute, generally in July, based on a critical development of the four parts of "Physics" and all the related material, experimental work included.

R. PROJECT EVALUATION:
a. Instruments used: Teachers' commentaries.
b. Control groups: None
c. Feedback process: Meetings of teachers discussing their personal feelings on feedback and describing the ways they have got it.
d. Behavioral objectives identified: Increased interest in physics subjects-matters.
e. Research evidence of objectives achieved: Maturity exams results are taken into consideration. No final statement officially issued so far.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The existing classes have been continued, but the whole project has not been expanded.

T. PLANS FOR THE FUTURE: Continuation of teacher training on PSSC material no longer on a "pilot" basis, but rather on a standing basis, by the Ministry of Education.

A. PROJECT TITLE: ADAPTATION OF BSCS HIGH SCHOOL MATERIALS INTO JAPANESE*

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: Yosito Sinoto. October, 1962.

C. PROJECT DIRECTOR: Yosito Sinoto.

D. PROJECT HEADQUARTERS ADDRESS: c/o Department of Biology, International Christian University, Mitaka, Tokyo, Japan.

E. PROFESSIONAL STAFF: Yosito Sinoto, Chairman; Committee Members: Hisao Morikawa, Yujiro Nakajima, Isao Komatsu, Haruo Kinosita, Jukichi Shimoizumi, Kazutosi Nisizawa, Tomoo Miwa, Kazuhiko Nakayama, and Sherman A. Hoslett; William Utley, Consultant for Japan BSCS Committee, Biology Teacher, American S.I.J. and Con.

F. PROJECT SUPPORT: The Asia Foundation Binational (Partial).

G. SPECIFIC PURPOSES AND OBJECTIVES: Adaptation of BSCS materials into Japanese; acquaintance with the philosophy of BSCS; assist teacher training activities; and exchange of information on Biology Education between Japan and the U. S.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: High School, 10th grade biology.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. BSCS News Letter, Nos. 1 and 2.
2. Adapted BSCS Blue Version text and laboratory instruction (to be published by July, 1966).

J. USE OF PROJECT MATERIALS: Approximately 100 teachers are considering using the complete program.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Japanese

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None at present. Possibly Blue Version Lab., etc., into English for U. S. schools in Japan.

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED:

3. Adaptation of BSCS Yellow and Green Versions.
4. BSCS Second Courses, Lab. Blocks.

N. MATERIALS AVAILABLE FREE: BSCS News Letter, through BSCS Com. in Japan.

O. MATERIALS PURCHASABLE: Adapted BSCS Blue Version, 5,000 yen (about $14.00).

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Feedback from 150 biology teachers; several seminars of biology teachers and university professors; comparison with currently used traditional materials; trial use of materials; examination for comprehension and retention; and requesting users of textbook to send reactions.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: One week institutes at Science Centers; training for Lab. activities; prefectural Science Centers, about 40 places. Briefing Sessions - 1st: August, 1963 at International Christian University, Introduction of BSCS; 2nd:

July, 1966 at International Christian University, Method of Implementation of BSCS; Joint conference of Japan and U. S. biology teachers.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Japan-U. S. Joint Conference for BSCS Japanese Blue Version, July-August, 1965; teachers' training seminars; and about 20 one- or two-day sessions.

S. PLANS FOR THE FUTURE: Writing Conference for BSCS Japanese Yellow and Green Versions (January, 1967).

*Response made to 1966 Report.

A. PROJECT TITLE: THE CONFERENCE OF SCIENCE EDUCATION STUDY IN OSAKA, JAPAN (CSES)

B. PROJECT DIRECTOR: Juzo Isemura, Institute for Protein Research, Osaka University.

C. PROJECT HEADQUARTERS:

a. Address: The Conference of Science Education Study, Keirinkan Publishing Company, Daido 4, Tennoji-ku, Osaka, Japan. Contact Dr. Kozo Imahori, Biology Department, College of General Education, Osaka University, Toyonaka-shi, Osaka, Japan.

b. Facilities available for viewing: Visitors are invited to meetings held monthly, and will present seminars. Available pamphlets and leaflets issued from the conference will be presented.

D. PRINCIPAL PROFESSIONAL STAFF: Juzo Isemura, Prof. Chemistry, Osaka University; Kozo Imahori, Prof. Biology, Osaka University; Nebuo Ikebe, Prof. of Geology, Osaka City University; Satoru Muto, Assoc. Prof., Yokohama National University; Shigenobu Tachimori, Assoc. Prof. Physics, Kanazawa University; Ryozo Nishida, Secretary of CSES, Keirinkan Publishing Company.

E. PROJECT SUPPORT: Keirinkan Publishing Company.

F. PROJECT HISTORY:

a. Principal originators: Kozo Imahori and Nobuo Ikebe.

b. Date and place of initiation: Nov. 1964; Osaka, Japan.

c. Reason for initiation: In Japan school science is directed strictly now by "Curricula syllabus" which was issued by Japanese Government in 1958. A revised syllabus is expected to appear in 1968. The main aim is to advise our ideal curricula to the Ministry of Education.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To improve and modernize education of both elementary and secondary school science. The unique characteristics of the project is to make curricula throughout grades 1-12.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Science I - IX (Grades 1 through 9); Physics, Chemistry, Biology and Geology (senior high school).

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

Kenri

1. Study on BSCS; 2. Study on PSSC; 3. Study on CHEMS; 4. Study on ESCP.

Syo: 14. Study on ESS 1; 15. Study on ESS 2-1; 16. Study on ESS 2-2.

K. MATERIALS AVAILABLE FREE: Syo: Nos. 14, 15, 16 (see J).

L. MATERIALS PURCHASABLE: Kenri: Nos. 1, 2, 3, 4 - ¥80 each. (See J).

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Japanese

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS: About 10,000 teachers are using the materials.

P. MATERIALS PRESENTLY BEING DEVELOPED: Proposal Curricula Syllabus; New text books.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: At present, teachers are invited to monthly meetings and joint discussions.

R. PROJECT EVALUATION: Still in the preliminary phase.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Several pamphlets were issued. Monthly meetings have been held regularly.

T. PLANS FOR THE FUTURE: Writing conference for improved textbooks will be started in 1968.

A. PROJECT TITLE: GENERAL CHEMISTRY COURSE PLAN BASED ON CONCEPTS OF ENERGY AND STRUCTURE

B. PROJECT DIRECTOR: Bun-ichi Tamamushi, Tokyo Joshi Daigaku (Tokyo Woman's Christian College), Zempukuji 2, Suginamiku, Tokyo, Japan

C. PROJECT HEADQUARTERS:
   a. Address: Same as "B" above; Contact: Project Director
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Bun-ichi Tamamushi, Chairman; Committee Members: Saburo Nagakura (University of Tokyo); Hiroshi Minato (International Christian University); Kenji Tamaru (University of Tokyo; Reita Tamamushi (Institute for Physical and Chemical Research); Koshiro Yoshioka (University of Tokyo)

E. PROJECT SUPPORT: Ministry of Education, Japan

F. PROJECT HISTORY:
   a. Principal originator: Bun-ichi Tamamushi
   b. Date and place of initiation: April 1, 1965; Tokyo
   c. Reason for initiation: According to suggestions and recommendations made by the joint Japan-U. S. conference on college chemistry which was held in Japan on 16-20 November 1964

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To improve traditional introductory chemistry course and to explore the problem how to introduce and interrelate fundamental concepts of energy and structure through thermodynamics, quantum mechanics and statistical mechanics and to make an integrated single course plan.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Introductory chemistry course plan for 1st and second year students of colleges and universities

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: 1. Mimeographed presentation of the outline of the new course plan.

K. MATERIALS AVAILABLE FREE: None at present

L. MATERIALS PURCHASABLE: None at present

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Japanese

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: English

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: Not described
   b. Some specific schools where your course is being taught: University of Tokyo (National) and Gakushuin University (private)

P. MATERIALS PRESENTLY BEING DEVELOPED: None

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None

R. PROJECT EVALUATION: None described

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The main contents and their teaching methods have been worked out during 1965-66 on which mimeographed presentations are under preparation.

T. PLANS FOR THE FUTURE: Writing committee for the new course as well as committee for exploring plan for laboratory and lecture experiments will be started in 1967.

A. PROJECT TITLE: ELEMENTARY SCIENCE TEXTBOOK EDITING PROJECT*

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: Ministry of Education. 1963.

C. PROJECT DIRECTOR: Choi Yung Bok, Chief editor of Textbook Bureau.

D. PROJECT HEADQUARTERS ADDRESS: Bureau of Textbooks, Ministry of Education, Seoul, Korea.

E. PROFESSIONAL STAFF: Chung Yun Tai, Professor of College of Education, Seoul National University; Su Yong Hwa, Chief of Astronomy section, National Meteorological Observatory; Lee Chung Chan, Principal of Kwang Chang Primary School; Chi Sam Kyu, Teacher of Attached Primary School, Choongang University; Pak Man Kyu, Professor of Catholic Medical College; Kang Han Soo, Principal of Bangsan Primary School; Lee Kil Sang, Professor of Science and Engineering College, Yunsei University; Son Chi Moo, Professor of Arts and Science College, Seoul National University; Choi Ki Chul, Professor of College of Education, Seoul National University; Im Beng Ki, Chung Choon Mo, Editors of Science Textbook, M.O.E.

F. PROJECT SUPPORT:
a. Organizational sponsorship: Ministry of Education.
b. Funding agency: Ministry of Education.

G. SPECIFIC PURPOSES AND OBJECTIVES: To edit the new Elementary Science Textbooks to conform to the curricular criteria which were established in 1963.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Elementary Science Textbooks, Grade 1 - Grade 6.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: Elementary Science Textbook:

1. Grade 1 - 1
2. Grade 1 - 2
3. Grade 2 - 1
4. Grade 2 - 2
5. Grade 3 - 1
6. Grade 3 - 2
7. Grade 4 - 1
8. Grade 4 - 2
9. Grade 5 - 1
10. Grade 5 - 2*
11. Grade 6 - 1
12. Grade 6 - 2*

*will be printed by June 15, 1966

J. USE OF PROJECT MATERIALS: All teachers of primary schools in Korea (almost 80,000 persons) are using the complete program.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Korean

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed.

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: Teachers' Guides for each level.

N. MATERIALS AVAILABLE FREE: None

O. MATERIALS PURCHASABLE: Materials can be purchased from the Korean Textbook Company ($1 = 275 won):

1. 12 won
2. 13 won
3. 13 won
4. 13 won
5. 11 won
6. 12 won
7. 11 won
8. 12 won
9. 13 won
10. 12 won
11. 11 won
12. 13 won

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: The evaluation of textbooks has been planned by the education specialist of the Central Education Research Institute, Seoul, Korea. Under the Science Education Study Committee, the Elementary Science Education Study Committee will be organized in September, 1966. This study committee will take charge of evaluation of textbooks for the Curriculum Study Group of SESC.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Institutions for pre-service education - 13 junior normal colleges. At these colleges the courses of physics, chemistry, biology, and earth science are to be taken by students on the basis of 2 credits in one semester. Institutions for in-service education and summer or winter workshops for teachers supported by the Education Board of Cities and Provinces have been sponsored by SESC.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: The schedule of editing the textbooks is as follows:

1964 - Grade 1-1, 1-2 Grade 2-1, 2-2
1965 - Grade 3-1, 3-2 Grade 4-1, 4-2
1966 - Grade 5-1, 5-2 Grade 6-1, 6-2

S. PLANS FOR THE FUTURE: This project will continue its activity and evaluation with the publication of teachers' guides, and the revised editions of the textbooks.

*Response made to 1966 Report.

A. **PROJECT TITLE:** NEW SCIENCE CURRICULUM STUDY PROJECT*

B. **PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION:** Science Education Study Committee. February 1966.

C. **PROJECT DIRECTOR:** Chung Yun Tai, Chairman of SESC.

D. **PROJECT HEADQUARTERS ADDRESS:** College of Education, Seoul National University, Seoul, Korea.

E. **PROFESSIONAL STAFF:** Chung Yun Tai, Professor of College of Education, Seoul National University; Choi Q Won, Professor of College of Arts & Science, Seoul National University; Kim Joon Min, Professor of College of Education, Seoul National University; Yoo National University; Kim Chi Yung, Professor of Yunsei University.

F. **PROJECT SUPPORT:**
   a. Organizational sponsorship: Science Education Study Committee.
   b. Funding agencies: Ministry of Education and USOM (expected).

G. **SPECIFIC PURPOSES AND OBJECTIVES:** To study the new science curricula, such as PSSC, CHEMS, BSCS, ESCP, SMSG, and IPS; to adapt these new curricula to the Korean situation; to train science teachers in the methods of the new curricula.

H. **SPECIFIC SUBJECTS AND GRADE LEVEL:** Grades 1-6, Elementary Science; Grade 7, Life Science; Grade 8, Physical Science; Grade 9, Earth Science; Grade 10, Biology; Grade 11, Chemistry; Grade 12, Physics.

I. **MATERIALS ALREADY PRODUCED AND DESCRIPTION:** Report on the Science and Mathematics Curriculum Study of Secondary Schools.

J. **USE OF PROJECT MATERIALS:** 5 teachers at pilot course this year.

K. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** PSSC Physics has been translated into Korean. CHEMS Chemistry will be translated into Korean by this year.

L. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** None described.

M. **ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED:** None described.

N. **MATERIALS AVAILABLE FREE:** None described.

O. **MATERIALS PURCHASABLE:** None described.

P. **SPECIFIC PLANS FOR EVALUATION OF MATERIALS:** The new curricular materials mentioned above will be evaluated by the study members of this project with the cooperative study of education specialists. The Science Education Study Committee has set up a five-year plan for improvement of science education. Within this period study activities of new curriculum materials, adaptation to the Korean situation, training of science teachers and so on, will be accomplished. After the five-year plan we will edit the new science textbooks through grade 1 to grade 12. These textbooks will be evaluated by science teachers and education specialists.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** During the five years, the courses of PSSC physics, CHEMS chemistry, BSCS biology, ESCP earth science, SMSG mathematics, and so on, will be offered to the students of each of the fields at the College of Education as professional courses. For the in-service training the Science Education Study Committee will set up the Institutes of PSSC, CHEMS, BSCS, ESCP, SMSG and the like under the sponsorship of Ministry of Education, USOM and some other agencies concerned.

R. **PROJECT ACTIVITIES SINCE MARCH 1965 REPORT:** From February 28 to March 4, 1966, we held "Onyang Curriculum Conference" for secondary school science and mathematics. In the reports of this conference we recommended the following offering of courses to the Ministry of Education:

Grade 7 - Life Science
Grade 8 - Physical Science
Grade 9 - Earth Science
Grade 10 - Biology
Grade 11 - Chemistry
Grade 12 - Physics

The above-mentioned courses will be designed along the lines of the new movements, such as PSSC physics, CHEMS chemistry, and so on. These are characterized by modernizing the content and systematizing the presentation. Actually, the above courses are to be taken by students at school according to the following:

(a) Life science, Physical science, and Earth science are requisite courses for all students.

(b) Time allotments of these courses are 5 class hours per week for each course.

(c) Biology, Chemistry, and Physics are required courses for science majoring students; on the other hand, more than two courses are to be selected by other students.

(d) Unit allotment of these courses is 12-14 for each course (including experiments and practicing).

(e) Biology, Chemistry and Physics courses are to be flexible for grade.

S. **PLANS FOR THE FUTURE:** In general, during the first of the five years, activity will center on the collection and examination of the new materials. Improvement, adaptation and translation will follow. Pilot courses will be established to be followed by feedback courses, and finally a Korean version of the manuscript. Teacher training programs will continue throughout the five-year period.

*Response made to 1966 Report.

A. PROJECT TITLE: INTER-AMERICAN PROGRAM FOR IMPROVEMENT OF SCIENCE TEACHING - PROJECT 212 (PIMEC)

B. PROJECT DIRECTOR: Andrés Valeiras, Field Director, Casilla de Correo 2620, Distrito 2-Pocitos, Montevideo, Uruguay. Tel: 417012.

C. PROJECT HEADQUARTERS:
a. Address: Unit of Education and Research, Department of Scientific Affairs, Pan American Union, Washington, D. C. 20006. Tel: 202-EX 3-8450. Contact: Headquarters: Heitor G. de Souza. Field: Andres Valeiras.
b. Facilities available for viewing: It depends on the activities that will be held during the visit.

D. PRINCIPAL PROFESSIONAL STAFF: Headquarters - Dept. of Scientific Affairs: J. D. Perkinson, Director; M. Alonso, Deputy Director; H. G. de Souza, Head, Unit of Education & Research; J. Saiz del Rio, Program Specialist; R. S. Dorney, Program Specialist. Field Office: Ing. Andrés Valeiras, Field Director.

E. PROJECT SUPPORT: Organization of American States - Program of Technical Cooperation and Government of Uruguay.

F. PROJECT HISTORY:
a. Principal originators: Department of Scientific Affairs, Pan American Union, OAS; Technical Cooperation Program, OAS.
b. Date and place of initiation: July 1, 1964. Headquarters of the OAS, Washington, D. C.; From April 1, 1965, Montevideo.
c. Reason for initiation: The necessity to collaborate with the improvement of science teaching programs in Latin American countries, so to expedite their developing programs.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The basic objectives of Project 212 are the improvement of the teaching of the sciences and mathematics in the Member Countries of the OAS within the framework of the program of technical cooperation. To obtain these objectives the following activities are carried out: short intensive and advanced courses for university professors - 3 months duration - in the specialties of mathematics, physics, chemistry and biology; training courses for teachers of pedagogical institutes and science supervisors of the ministries of education - 3 months duration; short training and information seminars for the groups mentioned above (held in conjunction with short intensive and advanced courses mentioned above); the cooperation of the project with national courses that have the same objectives; study of present curriculum used in secondary schools and teachers' colleges; publication and translations of scientific monographs for the use of teachers; information services by means of a news bulletin.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics, physics, chemistry and biology - university and secondary school levels.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Classnotes for use of course participants.
2. Boletin de Informaciones; published bimonthly. Nos. 1 to 10.
3. Suplemento del Boletin de Informaciones. No. 1.

K. MATERIALS AVAILABLE FREE: 1. (most of them are out of print); 2. Boletin de Informaciones; 3. Suplemento (out of print).

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Spanish

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 313

b. Some specific schools where course is being taught: We have no information yet.

P. MATERIALS PRESENTLY BEING DEVELOPED:

4. Short scientific monographs and teachers' guides.
5. Collection of programs presently adopted in different countries of Latin America.
6. Translations into Spanish of materials suitable for use in Latin America.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION:

Courses for Univ. Profs.	Dates	Place	No. of Participents	No. of countries
Chemistry	12/28/64- 2/26/65	Nat. Autonomous Univ. of Mexico	25	14
Physics	12/28/64- 2/26/65	Technical Institute of Aeronautics, Brasil	17	9
Chemistry	6/14/65 9/10/65	University of the Oriental Republic of Uruguay	18	11
Physics	9/6/65 11/26/65	University of the Oriental Republic of Uruguay	20	9
Mathematics	9/13/65 12/10/65	University of the Oriental Republic of Uruguay	32	13
Algebra	1/10/66 4/1/66	University of the Oriental Republic of Uruguay	27	11
Physics	9/23/66 12/23/66	Federal University of Pernambuco, Brasil	20	8
Biology	9/23/66 12/23/66	Peruvian Univ. "Cayetano Heredia, Lima	28	12
Chemistry	9/26/66 12/23/66	University of the Oriental Republic of Uruguay	22	12

Courses for Secondary Teachers	Dates	Place	No. of Participants	No. of countries
Chemistry	2/ 7/66 2/19/66	University of the Oriental Republic of Uruguay	25	1
Statistics	6/ 2/66 6/28/66	"Dámaso A. Larrañaga" Institute, Montevideo	16	1
Biology	7/ 4/66 7/16/66	Crandon Institute, Montevideo	34	1
Physics	7/ 4/66 7/16/66	University of the Oriental Republic of Uruguay	11	1
Mathematics	7/ 4/66 7/16/66	University of the Oriental Republic of Uruguay	18	1

R. **PROJECT EVALUATION:** Letters from fellows informing about: a) the science teaching improvement in using the knowledge and teaching methods acquired in the courses; b) the reprint in several countries of materials published by the PIMEC.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** See Q.

T. **PLANS FOR THE FUTURE:** None described.

A. PROJECT TITLE: **EAST PAKISTAN EDUCATIONAL EQUIPMENT DEVELOPMENT BUREAU** *

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: Ford Foundation and E. Pakistan Directorate of Technical Education. April, 1965.

C. PROJECT DIRECTOR: Waquar Ahmed.

D. PROJECT HEADQUARTERS ADDRESS: Education Directorate Building, Abdul Ghani Road, Dacca-2, E. Pakistan.

E. PROFESSIONAL STAFF: William Blase, Advisor.

F. PROJECT SUPPORT:
   a. Organizational sponsorships: Ford Foundation; Department of Technical Education.
   b. Funding agencies: Ford Foundation; Government of Pakistan.

G. SPECIFIC PURPOSES AND OBJECTIVES: Reduce foreign exchange through design and manufacture of science equipment in the country; improve equipment to meet local conditions and current syllabi; teach maintenance procedures to teachers and institutions; provide advisory service to science apparatus manufacturers.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Primary through Higher Secondary in High Schools and Vocational Schools.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:
   1. List of standard equipment.
   2. Fifteen prototypes and related drawings.
   3. Syllabi comparison reports.

J. USE OF PROJECT MATERIALS: In Education Extension Center-Dacca, and local high schools.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Bengali

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: Complete list of equipment for local manufacture. Survey of equipment presently in schools and future needs.

N. MATERIALS AVAILABLE FREE: Brochure; Curriculum comparison report.

O. MATERIALS PURCHASABLE: None at this time.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Through local quality control and school experience. The project has only begun with the Pakistani personnel coming in June 1966.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: It is planned to build model classrooms for equipment evaluation and teacher training. Also, workshops are to be conducted in local schools and classes taught in local science workshops at the Extension Center.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Not previously reported.

S. **PLANS FOR THE FUTURE:** Propose to complete design and manufacture of prototypes by June, 1967. 100 schools will be part of the evaluation and will receive full sets of equipment. Specification books will be prepared listing equipment, description, manufacturer, repair facilities and price. A quality control center will be set up to test equipment from manufacturers before sending to schools.

*Response made to 1966 Report.

A. PROJECT TITLE: DEPARTMENT OF EDUCATION, TERRITORY OF PAPUA NEW GUINEA SECONDARY SCHOOLS MATHEMATICS COURSE. FORMS 1-4.

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: K. C. Lovitt, Superintendent Curriculum, 1966.

C. PROJECT DIRECTOR: K. C. Lovitt.

D. PROJECT HEADQUARTERS: Secondary Division, Department of Education, Konedobu, P. N. G.

E. PROFESSIONAL STAFF: R. O. Bell; R. Blacklock; K. Lamacraft; W. O'Donnell; F. Scott; T. B. Smith; A. Whittred; Father K. Barr; Sister M. Terence.

F. PROJECT SUPPORT: Department of Education.

G. PURPOSES AND SPECIFIC OBJECTIVES: To develop Modern Mathematics courses for all pupils (girls and boys) attending the 23 Administration High Schools and 35 Mission High Schools in P. N. G.

H. SPECIFIC SUBJECTS AND GRADES: Mathematics for Forms 1-4 (Grades 7-10).

I. MATERIALS ALREADY PRODUCED:

1. Mathematics Syllabus Form 1.
2. Mathematics Syllabus Form 2.
3. Mathematics Syllabus Form 3.
4. Mathematics Syllabus Form 4.

J. USE OF PROJECT MATERIALS: Starting in February 1967 all mathematics teachers in the Territory High Schools will commence at least partial use of the materials and methods involved in the course.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES IN WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

M. MATERIALS PRESENTLY BEING DEVELOPED:

5. Group Activity Cards and Materials.
6. Additional Teacher guidance notes.
7. Evaluation Tests.

N. MATERIALS AVAILABLE FREE: Single copies of each Syllabus in limited numbers.

O. MATERIALS PURCHASABLE: None

P. PROJECT EVALUATION: Teachers' subjective assessments; evaluation tests to be given when completed; long-term evaluation programs have not been finalized.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A comprehensive set of extension notes accompanies the syllabus. A series of circulars describing various phases of project have been circulated to all teachers. More, and follow up circulars, are planned. A series of Seminars on a Regional basis are planned; some have already taken place; many others are scheduled over the next 3 months.

R. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not previously reported.

S. **PLANS FOR THE FUTURE:** Circulars will be prepared and distributed describing any refinements and modifications which may become apparent during the full scale operation. Revision of syllabuses to co-ordinate with the progress of the concurrent Primary Modern Mathematics project to coincide with the first full graduates of the Primary Program - anticipated in 1972.

A. PROJECT TITLE: DEPARTMENT OF EDUCATION, TERRITORY OF PAPUA AND NEW GUINEA, SECONDARY SCIENCE COURSE FORMS 1-4.

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: M. N. Maddock a/Inspector High Schools, Department of Education, Konedobu, Papua and New Guinea - 1965

C. PROJECT DIRECTOR: M. N. Maddock

D. PROJECT HEADQUARTERS: Secondary Division, Department of Education, Konedobu, Papua and New Guinea

E. PROFESSIONAL STAFF: Selected teachers from High Schools in Territory, from 1967 on U. N. Technical Adviser, University Adviser

F. PROJECT SUPPORT: Department of Education, UNICEF-UNESCO (from 1967)

G. PURPOSES AND SPECIFIC OBJECTIVES: To develop a General Science course appropriate to Papua and New Guinea conditions with techniques for developing basic concepts and understanding by teaching in English as a foreign language. The course is for boys and girls and will lead to the School Certificate examination at the end of four years. This examination will be the qualifying examination for entry to the Preliminary Year of the University of Papua and New Guinea.

It will operate in high schools operated by the Administration of Papua and New Guinea and the various Christian Missions.

At present there are 23 Administration High Schools and 35 Mission High Schools in the Territory, and this is steadily expanding.

H. SPECIFIC SUBJECTS AND GRADES: General Science embracing Physics, Chemistry, Biology and Geology for Forms I-4 (grades 7 - 10).

I. MATERIALS ALREADY PRODUCED:

1. Draft Syllabus Forms I - II at present undergoing two year trial period before writing of Forms III - IV (Issued 1966). A suggested course of study is attached.
2. Temporary Advanced Level syllabus for Forms III - IV (Issued 1966) as an interim measure to bridge gap from the old syllabus in use (Sarawak Science Syllabus and New South Wales Science Syllabus)
3. "Achievements of Standards in Science Sc 8/65" circular outlining the philosophy behind the new syllabus.
4. Equipment: The Education Department has already put considerable equipment into schools but has had difficulty in providing sufficient material to cover class sizes. UNICEF is assisting by providing a wide range of equipment in 1967 which should enable the spirit of the new syllabus to be instituted.

J. USE OF PROJECT MATERIALS: Starting in 1966, all Territory High Schools have embarked on the new draft syllabus in Form I. This will carry into Form II in 1967. The Form III and Form IV syllabus will be developed before the end of 1967 to go into use in Form III in 1968.

In the meantime, classes above Form I in 1966 are carrying on with the old syllabi together with additional topics at Advanced Level for some pupils from the Temporary Advanced Syllabus.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES IN WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

M. MATERIALS PRESENTLY BEING DEVELOPED:
  5. Syllabus for Forms III and IV
  6. Teacher Guidance notes to the syllabus
  7. Evaluation tests

O. MATERIALS PURCHASABLE: None

P. PROJECT EVALUATION: A series of workshop sessions at Secondary Science Teachers' Seminars held with UNICEF financial assistance in 1967; Inspection visits to schools by project director, departmental inspectors and UNESCO Technical Adviser.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A set of teaching notes prepared in Sarawak for the Sarawak Science Syllabus contains some material appropriate to the new scheme. This is available in the schools; A series of circulars on phases of the work is being continually prepared and circulated to schools; Regional seminars are to be held in about May and August 1967 to discuss the philosophy behind the syllabus, to have workshop sessions on apparatus construction, and to see demonstrations of teaching technique, in addition to the evaluation referred to above; Visits by Education Department specialist inspector in Science teaching and United Nations Technical Adviser to assist teachers in the school; New course of Secondary Science Teacher training to start at Goroka Teachers' College in 1967 with United Nations Special Fund financial assistance and a lecturer provided by United Nations; Inservice training sessions at the Goroka Teachers' College in future years.

R. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported

S. PLANS FOR THE FUTURE: Workshop sessions at the 1967 Seminars will draw up proposals for the Form III - Form IV syllabus and suggest policy for Advanced level. These proposals will go to a small syllabus committee for an assessment and drafting into a new syllabus.

A. PROJECT TITLE: INSTITUTO PARA LA PROMÓCION DE LA ENSENANZA DE LA BIOLOGÍA (INSTITUTE FOR THE ADVANCEMENT OF BIOLOGY TEACHING)*

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: Eleven biologists of Peru. They work in 4 universities and in secondary schools. September, 1963.

C. PROJECT DIRECTOR: Manuel Vegas, Universidad Agraria, Apartado 456, Lima, Peru.

D. PROJECT HEADQUARTERS ADDRESS: Universidad Cayetano Heredia, Apartado 5045, Lima, Peru.

E. PROFESSIONAL STAFF: Manuel Vegas, Professor of Fisheries, Universidad Agraria; Raúl Ishiyama, Professor of General Biology, Universidad Cayetano Heredia; Lydia González, Prof. of Biology, Teachers School of La Cantuta; Estela de Maruenda, Aux. Prof. of Zoology, Universidad de San Marcos; Alberto Cazorla, Prof. of Biochemistry, Universidad Cayetano Heredia; Enrique Fernández, Prof. of Physiology, Universidad Cayetano Heredia; Ramiro Castro, Prof. of Pharmacology, Universidad Cayetano Heredia; César Morán, Prof. of Cytology, Universidad Agraria; Julia de Hidalgo, National Hygiene Institute; Santiago Ramos, Guadalupe School, Lima; Hernando Macedo, Checayani Laboratory, Puno; Augusto Vejarano, Aux. Prof. of Plant Physiology, Universidad Agraria.

F. PROJECT SUPPORT:

a. Organizational sponsorships: Universidad Cayetano Heredia and Universidad Agraria.
b. Funding agencies: Instituto Peruano de Fomento Educativo, Lima; Ford Foundation; Ministry of Education, Lima.

G. SPECIFIC PURPOSES AND OBJECTIVES: To modernize the biology knowledge of teachers and to promote the best teaching of biology, with modern materials, simple laboratory equipment, and intensive participation of students.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: College level, for teachers of biology in the secondary schools. In 1964 and 1965 summer courses: selected topics of Cytology, Biochemical Cytology, Animal Physiology, Ecology, Evolution and Genetics, with some 30 laboratory experiences. In 1966 summer course: Green Version of the BSCS.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. 30 Guides for Laboratory Experiments.
2. 1 Kit for Laboratory Experiments.

J. USE OF PROJECT MATERIALS: 92 teachers are using the complete program.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Spanish

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None described.

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: None described.

N. MATERIALS AVAILABLE FREE: None described.

O. MATERIALS PURCHASABLE: None described.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Written information from teachers, about the usefulness of the materials and suggestions to improve them, and personal visits to teachers, observations of the work, and discussion about success and difficulties.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None described.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Latin American Conference of Biology Teachers to discuss the problems involved in the use of BSCS. March, 1966. The recommendations are in press to have a pamphlet directing the teachers in the use of BSCS materials and methods.

S. PLANS FOR THE FUTURE:

1. New summer institutes.
2. Seminars about modern biology teaching, in various cities of the country.
3. Translations of some paperbacks to use for complementary lectures.
4. Publication of own works in special subjects.

*Response made to 1966 Report.

A. PROJECT TITLE: INSTITUTO PARA LA PROMOCION DE LA ENSENANZA DE LAS MATEMATICAS (FUNDADO EN 1961) - INSTITUTE FOR THE ADVANCEMENT OF MATHEMATICS TEACHING (FOUNDED IN 1961)

B. PROJECT DIRECTOR: Jose Tola, Universidad Nacional de Ingenieria, Apartado 4153, Lima, Peru, Tel. 7-0297

C. PROJECT HEADQUARTERS:

a. Address: Same as "B" above; Contact: Project Director

b. Facilities available for viewing: Summer Institutes for Mathematics and Physics (January and February).

D. PRINCIPAL PROFESSIONAL STAFF: Jose Reategui, Professor of Mathematics, UNI; Gerardo Ramos, Professor of Mathematics, UNI; Cesar Carranza, Professor of Mathematics, UNI; Victor Latorre, Professor of Physics, UNI; Holger Valqui, Professor of Physics, UNI.

E. PROJECT SUPPORT:

a. Organizational sponsorships: Universidad Nacional de Ingenieria, Ministerio de Educacion

b. Funding agencies: The Ford Foundation, NSF, Ministerio de Educacion, Instituto Peruano de Fomento Educativo

F. PROJECT HISTORY:

a. Principal originators: A team of five University Professors of Mathematics.

b. Date and place of initiation: Summer 1961; Lima

c. Reason for initiation: To improve and modernize the Mathematics and Physics knowledge of teachers and to promote the teaching of Mathematics and Physics in Secondary and Normal Schools.

G. PRESENT COMMERCIAL AFFILIATIONS: None described

H. PURPOSES AND SPECIFIC OBJECTIVES: College level for secondary and normal school teachers.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Modern Algebra, Analysis, Geometry and Physics

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

Textbooks for the Summer Institutes:

1. Set Theory
2. Logics
3. Analysis I
4. Analysis II
5. Algebra I
6. Algebra II
7. Geometry

K. MATERIALS AVAILABLE FREE: None described

L. MATERIALS PURCHASABLE: The aforementioned books from Project Headquarters

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Spanish

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None described

O. **USE OF PROJECT MATERIALS:** None described

P. **MATERIALS PRESENTLY BEING DEVELOPED:** None described

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Regional School of Mathematics (Devoted to training of College and Normal School Professors).

R. **PROJECT EVALUATION:** None described

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not previously reported.

T. **PLANS FOR THE FUTURE:** New Summer Institutes; To follow the program "Regional School of Mathematics"; Writing and printing new books for high school teachers.

A. PROJECT TITLE: **BUREAU OF PUBLIC SCHOOLS-PEACE CORPS/PHILIPPINES ELEMENTARY SCIENCE AND MATHEMATICS CURRICULUM DEVELOPMENT PROJECT**

B. PROJECT DIRECTOR: Mr. Aurelio Juele, Chief, Science Education Section, Special Subjects and Services Division, Bureau of Public Schools, Manila, Philippines, Tel. 3-34-88

C. PROJECT HEADQUARTERS:
a. Address: Same as "B", Contact: Mr. Aurelio Juele
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Aurelio Juele, Project Director; Efrain Abracia, Project Coordinator; Robert Alves, Peace Corps/Philippines Consultant for Mathematics; John Rhodes, Peace Corps/Philippines Consultant for Science

E. PROJECT SUPPORT: Bureau of Public Schools; Peace Corps/Philippines

F. PROJECT HISTORY:
a. Principal originators: Science Education Section, Special Subjects & Services Division, Bureau of Public Schools
b. Date and place of initiation: May 1965 (for elementary mathematics), January, 1966 (for elementary science); Manila
c. Reason for initiation: To update the curriculum content of the elementary science and elementary mathematics offerings. To provide teachers with guides that will help them teach the courses more effectively through the use of the discovery approach.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: This project is an on-going program involving curriculum materials development, try-out, and revision. Original materials in the form of teaching guides are tried out for a school year, and revised according to findings from feedback reports.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Elementary Science 1-6 (for Grades I-VI, ages 7-12); Elementary Mathematics 1-6 (for Grades I-VI, ages 7-12)

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Elementary Mathematics 1-4 (for Grades I-IV) 1st revision being used on a five year or less program of try-out.
2. Elementary Mathematics 5 and 6 (for Grades V and VI) original material undergoing a two-year period of try-out (revision planned to be held in summer 1968).
3. Elementary Science 3 (being tried out this school year and revised in summer 1967)
4. Elementary Science 4 (to be tried out in the school year 1967-1968).

K. MATERIALS AVAILABLE FREE: Bureau of Public Schools, Manila, Philippines - Items 1, 2, 3, 4, 5 (the last will be available in July or August 1968).

L. MATERIALS PURCHASABLE: None (These are BPS materials being produced by the BPS alone.)

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Philipino

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials. No specific number could be given. Material is available only to teachers who have had training in the new mathematics or science.

b. Some specific schools where course is being taught: Paranaque Elementary School I, Paranaque, Rizal, Phil.; E. de los Santos Elementary School, Malabon, Rizal, Phil.; Malolos Elementary School, Malolos, Bulacan, Phil.; Lucban Elementary School, Baguio City, Phil.; Lucena WEST Elementary School, Lucena City, Phil.; Zamboanga Normal College Laboratory School, Zamboanga City, Phil.

P. MATERIALS PRESENTLY BEING DEVELOPED: 5. Elementary Science 5 and 6 (original to be finalized in the summer of 1967).

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Summer program of in-service training (a six-week course for elementary science and elementary math teachers) with the content of developed guides as base of course content and learning approach in guides as learning approach in guides as learning approach in course offered in all government teacher-training schools; Study groups on school, town or district levels (an on-going semestral or school year long programs of forthnightly meetings by teachers of a grade) to study the guides and exchange of experiences in teaching the new materials offered in specific schools, towns or school districts.

R. PROJECT EVALUATION:

a. Instruments used: Feedback report; observation; reports of supervisors and coordinators

b. Control groups: None

c. Feedback process: After teaching a unit, the "try-out" teacher accomplishes a report form on the unit giving its strong and suggestions for improvement. Secondarily, tri-monthly reports from field science supervisors and coordinators are received.

d. Behavioral objectives to be evaluated: Yes, those mentioned in our course, unit and topic objectives.

e. Research evidence of objectives achieved: No organized quantitative data yet. Informal reports on the improved attitude and achievement of the pupils using the new math materials and our own observations of the new math classes.

f. Other pertinent information: Evaluation of the total program will be requested of the Research, Evaluation and Guidance Division, BPS, not the Science Education Section, to avoid possible partiality.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The Elementary Mathematics 1-4 guides was revised in the summer of 1966 and sent to all school divisions and normal schools for use by elementary grades teachers who have had some training in the new math. Elementary Math 5 and 6 were developed at the same time and are now being used by a few selected classes.

Elementary Science III is being tried out this school year

1966-67), and will be revised (considering the feedback received from teachers and supervisors) in May-June, 1967. Elementary Science 4 guide was edited and finalized by a group in February, 1967.

T. PLANS FOR THE FUTURE: Elementary Science 3 revision, May, June 1967; Elementary Science 5 and 6 development, May, June 1967; Elementary Mathematics 5 and 6 revision, May, June 1968; Elementary Science 1 and 2 revision (of old guide), May, June 1969.

A. PROJECT TITLE: NATIONAL SCIENCE DEVELOPMENT BOARD-BUREAU OF PUBLIC SCHOOLS-PEACE CORPS/PHILIPPINES-UNIVERSITY OF THE PHILIPPINES SECONDARY SCIENCE AND MATHEMATICS AIDES PROJECT

B. PROJECT DIRECTOR: Dr. Liceria B. Soriano, Assistant Director, Bureau of Public Schools, Manila, Philippines, Tel. 22-11-70; 40-13-87

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above; Contact: Project Director
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Liceria B. Soriano, Assistant Director, Bureau of Public Schools; Carolina V. Perez, Project Coordinator; Robert Alves, Peace Corps/Philippines Consultant for Mathematics.

E. PROJECT SUPPORT: Bureau of Public Schools; Peace Corps/Philippines

F. PROJECT HISTORY:
a. Principal originators: Science Education Section, Special Subjects & Services Division, Bureau of Public Schools
b. Date and place of initiation: Summer 1963; Manila (Tentative Curriculum Guide for General Science I-II, Summer 1964; Developed Curriculum Guide for Math. I.)
c. Reason for initiation: To up-date the curriculum content of the secondary mathematics offerings. To provide teachers with guides that will help them teach the courses more effectively through the use of the more accepted inductive approach.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: This project is an on-going program involving curriculum materials development, try-out, and revision. Original materials in the form of teaching guides are tried out for a school year or more and revised according to findings from feedback reports.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Math I (age 13-14); Math II (age 14-15); Math III (age 15).

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. General Science I & II (for first and second year high schools)
2. Mathematics I, II (for first and second year high schools)
3. Mathematics III (for third year high school 1st semester)
Original Material is undergoing a try-out for a period of two years. (Revision planned to be held in summer of 1968)

K. MATERIALS AVAILABLE FREE: No free materials because of limited funds.

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None described

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: More or less 200

b. Some specific schools where course is being taught: Bacolod City High School (Bacolod City); San Francisco High School (Quezon City); Jose Abad Santos High School (Manila); Manila High School (Manila); San Miguel High School (Bulacan).

P. MATERIALS PRESENTLY BEING DEVELOPED: None

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Material will be introduced in summer science institutes.

R. PROJECT EVALUATION:

a. Instruments used: Feedback report; Reports of observations made by supervisors and coordinators during their supervisory visits in the field.

b. Control groups: None

c. Feedback process: After teaching a unit, the "try-out" teachers accomplish a report form on the unit giving its strong and weak points and also suggestions for improvement.

In addition, tri-monthly reports from field science supervisors and coordinators are received.

d. Behavioral objectives identified: Yes, those mentioned in the course, unit and topic objectives.

e. Research evidence of objectives achieved: No organized quantitative data yet. However, we have informal reports on the improved discovery approach, etc., of the students using the new math.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The Secondary Mathematics II guide was revised in the summer of 1966 and sent to the various high schools previously using the original guide. Secondary Mathematics III was also developed at the same time and are now being used in some selected high schools.

T. PLANS FOR THE FUTURE: Mathematics IV development, Summer 1967; Mathematics III revision, Summer 1968.

A. PROJECT TITLE: NOTRE DAME EDUCATIONAL ASSOCIATION SCIENCE AND MATHEMATICS PROGRAM (NDEA SCIENCE AND MATHEMATICS TEACHING AND TESTING)

B. PROJECT DIRECTOR: Dr. Federico C. Aquino, Executive Director, Notre Dame Educational Association, Almonte Street, Cotabato City, Philippines.

C. PROJECT HEADQUARTERS:
a. Address: Same as B. Contact the Project Director.
b. Facilities available for viewing: None.

D. PRINCIPAL PROFESSIONAL STAFF: J. Damian Teston, FMS, Dean, Notre Dame of Marbel College, Cotabato; Robert F. Lafleur, FMS, Chairman, Mathematics Department, Belen de Jesus, Chairman, Teacher Education, and Thomas E. Hennessey, FMS, Chairman, Science Department, Notre Dame of Marbel College, Cotabato; Robert E. Sullivan, OMI, Dean, Notre Dame of Tacurong College, Cotabato; Felix E. Gilligan, FMS, Supervisor, Marist Schools and Colleges, Far East, Marists, Tamontaka, Cotabato City.

E. PROJECT SUPPORT:
a. Organizational sponsorships: The Notre Dame Educational Association; Notre Dame of Marbel College, Koronadal, Cotabato.
b. Funding agencies: Ford Foundation, The National Science Development Board (Republic of the Philippines), The Notre Dame Educational Association.

F. PROJECT HISTORY:
a. Principal originators: Federico C. Aquino, Robert E. Sullivan, OMI, and Felix E. Gilligan, FMS.
b. Date and place of initiation: April 1963, Notre Dame of Cotabato Colleges, Cotabato City.
c. Reason for initiation: Basically, to raise student achievement levels through making available to Association schools realistic course objectives and efficient evaluative tools.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The initial purpose still per tains to raising achievement levels. This project is differentiated from similar projects in that it is founded on the students' pre-secondary background and not upon assumed or imposed secondary level objectives.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Seventh year of school - Review Arithmetic, General Science; Eighth year of school - Elementary Algebra, General Science; Ninth year of school - Intermediate Algebra, Biology; Tenth year of School - Geometry, Physics and Chemistry.

[Six years of elementary school; four years of secondary].

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Mathematics I Syllabus (Review Arithmetic) and Year-end Examinations, 1964-1967.
2. Mathematics II Syllabus (Elementary Algebra) and Year-end Examinations, 1965-1967.

3. Mathematics III Syllabus (Intermediate Algebra) and Year-end Examination, 1967.
4. Statistical Analyses of Examination Results, 1964-1966.

K. **MATERIALS AVAILABLE FREE:** 1, 2, 3, and 4 are available in a very limited supply from NDEA, Almonte Street, Cotabato City, Philippines.

L. **MATERIALS PURCHASABLE:** None

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** None

O. **USE OF PROJECT MATERIALS:**

a. Number of teachers using materials: Approximately 1,000.
b. Some specific schools where course is being taught: All the Notre Dame High Schools of the Provinces of Cotabato and Sulu, Philippines; 48 secondary schools. Specifically, the Notre Dames of the Municipalities of Jolo, Sulu; Tacurong, Cotabato; Bongao, Sulu; Kidapawan, Cotabato.

P. **MATERIALS PRESENTLY BEING DEVELOPED:**

5. Revision of the Mathematics I Syllabus.
6. Development of a syllabus and teacher's manual for general science, seventh year.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Regularly scheduled seminars in the teaching of science and mathematics, two each semester. Summer institutes for teachers of science and mathematics. Semester seminars are held in the following centers: Jolo, Sulu; Rajah Buayan, Cotabato; Marbel, Cotabato; Cotabato City; Midsayap, Cotabato; and Kidapawan, Cotabato. Summer institutes, Notre Dame College, Marbel, Cotabato. Content, group development of procedures best suited to the course objectives; group development of instructional materials required by course objectives and limited resources.

R. **PROJECT EVALUATION:**

a. Instruments used: Critical checklists filed by teachers employing materials; Teacher conferences; Results of Year-end Examinations based on course outlines.
b. Control groups: None have been formally established, but informal groups are available for contrast/comparison.
c. Feedback process: See a and b above. In May 1967, a group of 20 teachers of mathematics will spend six weeks of study and discussion on the mathematics materials being used. The 20 teachers have been carefully selected from among all the teachers of the Association who have had experience with the materials.
d. Behavioral objectives identified: It is to be believed that such objectives have been identified. But neither personnel nor financial resources have permitted progress beyond a well-founded belief.
e. Research evidence of objectives achieved: The statistical analyses noted in item J - #4.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not previously reported.

T. **PLANS FOR THE FUTURE:** Each subject area will have its own syllabus; Year-end Examination, analysis of examination results; development of additional instructional materials and aids; periodic revision of the syllabus, the examination format and coverage and of the additional materials. Seminars and summer institutes will continue as described in Q. The vitality of the Association (NDEA) lends to the conviction that a continuous program is possible.

A. **PROJECT TITLE:** SCIENCE TEACHING CENTER, UNIVERSITY OF THE PHILIPPINES

B. **PROJECT DIRECTOR:** Dolores F. Hernandez, Science Teaching Center, University of the Philippines Diliman, Quezon City, Philippines.

C. **PROJECT HEADQUARTERS:**
a. Address: Same as B. Contact Project Director.
b. Facilities available for viewing: Try-out classes starting July, 1967.

D. **PRINCIPAL PROFESSIONAL STAFF:** Consuelo V. Asis, Chairman, Biology Work Group; Josefina Fonacier, Chairman, Mathematics Work Group; Porfirio Jesuitas, Chairman, General& Elementary Science Work Group; Segundo Roxas, Chairman, Physics Work Group; Pilar da Silva, Chairman, Chemistry Work Group; Aurora Minoza, Evaluation; Robert Ward, Project Consultant.

E. **PROJECT SUPPORT:**
a. Organizational sponsorships: University of the Philippines; Department of Education; National Science Development Board.
b. Funding agencies: The Ford Foundation; University of the Philippines; National Science Development Board.

F. **PROJECT HISTORY:**
a. Principal originators: Augusto Tenmatay; Enrique T. Virata; Dolores F. Hernandez.
b. Date and place of initiation: November 1, 1964. University of the Philippines.
c. Reason for initiation: Recognized need for improving science and mathematics textbooks locally produced for use in elementary and secondary schools of the country; also, the need to set a model of curriculum development which hopefully will establish a pattern for activities by other groups in the country.

G. **PRESENT COMMERCIAL AFFILIATIONS:** None for the present.

H. **PURPOSES AND SPECIFIC OBJECTIVES:** To prepare curriculum materials (student texts, teacher's guides and laboratory manuals) for elementary and secondary schools math and science. Major guidelines for the preparation of materials are: (1) to make science education more responsive to the needs of the country; (2) to use science and technology effectively in the achievement of national goals; (3) to produce scientifically literate citizens; (4) to stimulate the choice of scientific and allied careers by those with the corresponding aptitudes and thus increase the number of scientists, technologists, and technicians; (5) to communicate the excitement and aspiration of scientific endeavors and to increase the power of innovation and invention through an awareness of the methods of science; (6) to emphasize imaginative inquiry and promote skills for independent learning rather than dogmatic assertion and memorization of facts. This project differs from other local activities in having a staff devoting full-time to this work and in including a tryout program with intensive evaluation.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** Elem. Sci. (gr. 1-6) Average level 7-12; Elem. Math (gr. 1-6) Average level 7-12; H.S. Sci. I, Average level 13; H. S. Sci. II, Average level 14; Chemistry, Average level 15; Physics, Average Level 16; H. S. Math I, Average level 13; H. S. Math II, Average level 14; H. S. Math III & IV, Average level 15; Common Plants of the Phil.- for H. S. teachers; Common Animals of the Phil.- for H. S. Teachers; The Gene Concept - for high school teachers.

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:** The following will be ready as experimental editions by May, 1967:

1. Elementary Science, grades 1, 2 and 3.
2. Chemistry.
3. Physics.
4. High School Math I.
5. High School Math II.

K. **MATERIALS AVAILABLE FREE:** None except for brochure.

L. **MATERIALS PURCHASABLE:** Biology for Philippine High Schools, Alemar's, 769 Rizal Ave., Manila. Textbook - P16.90; lab. manual - 10.90; teacher's guide - P6.25 (P3.86 = $1.00).

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** Not planned.

O. **USE OF PROJECT MATERIALS:**

a. Number of teachers using materials: About 250 teachers use the biology book named in L.

b. Some specific schools where course is being taught: Jose Abad Santos High School, Meisic, Binondo, Manila; Talavera Provindial High School, Talavera, Nueva Ecija; Marcelo H. del Pilar High School, Malolos, Bulacan.

P. **MATERIALS PRESENTLY BEING DEVELOPED:**

6. Elementary Science 4, 5 and 6.
7. Elementary Math 1 to 6.
8. High School Math 3 and 4.
9. High School Science 1 and 2.
10. Common Plants of the Philippines.
11. Common Animals of the Philippines.
12. The Gene Concept.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Summer Institutes for teacher training on the BSCS adaptation have been run at various schools and universities for several summers. They have been sponsored by National Science Development Board and have included lectures, films, intensive lab work, and field trips using Biology for Philippine High Schools. Courses will be run at U.P. under the direction of S. T. C. to train the teachers who will be involved in the try-outs of the materials (see R).

R. **PROJECT EVALUATION:**

a. Instruments used: We will use tests in the different areas developed by the respective Work Groups of the Science Teaching Center. We shall use standardized U. S. made tests (none are locally constructed) merely to describe our groups (as a baseline) and not for purposes of comparison.

b. Control groups: It is planned to use a few. At present, stress is on formative evaluation.

c. Feedback process: Feedback will include teacher feedback, pupil reaction, observer's comments, pupils' achievement.

d. Behavioral objectives identified: Yes, particularly in elementary science.

e. Research evidence of objectives achieved: None yet.

f. Other pertinent information: The materials listed in J will be tried for 2 years in about 8 schools (16 classes) except for elementary science which will be tried only in 6 schools.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Several chapters/units of the materials mentioned in J have been produced in mimeographed form and tried out in one or two classes starting July, 1966 in preparation for the experimental editions.

T. PLANS FOR THE FUTURE:

For courses 1-5, see J

Summer institute for try-out teachers - May 15 to June 23, 1967.
Experimental years - July, 1967 - April, 1968.
July, 1968 - April, 1969.
Revised editions - 1970.

For the other courses

Summer institutes for try-out teachers - May, 1968-June, 1968.
Experimental year - July 1968-April 1969.
Revised editions - 1970.

A. PROJECT TITLE: MODERNIZATION OF THE TEACHING OF MATHEMATICS IN SECONDARY SCHOOLS*

B. PRINCIPAL ORIGINATORS: O.E.C.D. and the National Ministry of Education, of Portugal.

C. PROJECT DIRECTOR: Jose Sebastiao e Silva.

D. PROJECT HEADQUARTERS ADDRESS: Avenida Infante Santo, 68, F°., E - Lisboa 3, Portugal.

E. PROFESSIONAL STAFF: J. Sebastiao e. Silva, Professor of Mathematics, University of Lisbon; J. Furtado Leote, A. Augusto Lopes, M. Augusto da Silva, Teachers of Mathematics; J. Carneire de Silva, Inspector of Mathematics.

F. PROJECT SUPPORT: O.E.C.D. and the National Ministry of Education, of Portugal.

G. SPECIFIC PURPOSES AND OBJECTIVES: Introducing modern mathematics and new methods of mathematical education in the last two years of secondary schools (scientific section).

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Mathematical logic; Theory of Sets, relations and functions, in connection with analytic geometry; General algebraic structures: semigroups, groups, rings, fields and boolean algebras; Introduction to probability theory and statistics. Vectors, complex numbers, geometric transformations and linear mappings; Introduction to differential and integral calculus.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. Compendium of Mathematics I (pilot text).
2. Guide for Utilization of Compendium of Mathematics I.
3. Compendium of Mathematics II.

J. USE OF PROJECT MATERIALS: Twenty teachers are using the complete program. Several high schools in Lisbon, Oporto, Coimbra, Oeiras and Leirra are teaching the course.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Portuguese

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed.

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: 4. Guide for Utilization of Compendium of Mathematics II.

N. MATERIALS AVAILABLE FREE: None described.

O. MATERIALS PURCHASABLE: None described.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Ordinary testing procedures. Materials are being used quite successfully both by teachers and pupils.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Summer courses during vacations, near Lisbon, and T.V. lectures on selected topics in modern mathematics and new teaching methods.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Not previously reported.

S. PLANS FOR THE FUTURE: Continuation of the preceding project along the same lines.

*Response made to 1966 Report.

A. PROJECT TITLE: **THE NORDIC COMMITTEE FOR THE MODERNIZING OF SCHOOL MATHEMATICS***

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: The Nordic Commission of Culture. July, 1960

C. PROJECT DIRECTOR: Lennart Sandgren

D. PROJECT HEADQUARTERS ADDRESS: Ecklesiastikdepartementets kommittelokaler, Fack, Stockholm 5, Sweden

E. PROFESSIONAL STAFF: Matts Håstad, Secretary; Gertrude Wistedt, Assistant

F. PROJECT SUPPORT:
  a. Organizational sponsorship: Formerly OECD, Paris
  b. Funding agencies: The Governments in Denmark, Finland, Norway, and Sweden

G. SPECIFIC PURPOSES AND OBJECTIVES: To renew school mathematics in all school stages. Obsolete subjects are deleted. The concept formation is stressed; sets, elementary logic, functions, vectors, and basic laws of arithmetic are emphasized.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Texts for the whole school are published (Grades 1-12). For Grades 11-12 special texts on statistics and probability and differential equations are published.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: 34 experimental textbooks for all school stages, as follows:
  1. 6 for grades 1-3
  2. 9 for grades 4-6 (a translation from School Mathematics Study Group)
  3. 10 for grades 10-12
  4. 9 for grades 7-9

J. USE OF PROJECT MATERIALS: 180 teachers in grades 1-9, and 150 teachers in grades 10-12 are using the complete program, and 30 teachers are using portions of it.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Danish (some); Norwegian (some); Finnish (some); Swedish (some).

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None, so far.

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: No more experimental texts will be published. The Committee is now working on the final report to be published during the early part of 1967.

N. MATERIALS AVAILABLE FREE: A short report in English which details the contents of texts and describes the type of student for which the program was designed.

O. MATERIALS PURCHASABLE: The material under I can be purchased. Under special conditions it can be supplied free. A price list follows. Write to: The Nordic Committee for the Modernizing of School Mathematics, "Nordiska Kommitten för modernisering av matematikundervisningen, Ecklesiastikdepartementets kommittelokaler Fack, Stockholm 5, Sweden".

Text	Designation	Price (sv.kr)
Mathematics		
Grade 1	M 1 I - II	5:-
Grade 2	M 2	4:-
Grade 3	M 3	4:-
Grade 4	M 4 I; M 4 II; M 4 III	3:50 ea.
Grade 5	M 5 I; M 5 II; M 5 III	3:50 ea.
Grade 6	M 6 I; M 6 II; M 6 III	3:50 ea.
Algebra	A 7-9 I; A 7-9 II;	
Grades 7-9	A 7-9 III 2S; A 7-9 III 3S;	
	A 7-9 IV 1S; A 7-9 IV 2S;	
	A 7-9 V 1S; A 7-9 2S;	
	A 7-9 I 3D; A 7-9 II 3D	5:-- ea.
Geometry	G 7-9 I; NG 7-9 I;	
Grades 7-9	NG 7-9 II	5:-- ea.
Algebra	A 10-12 I; A 10-12 II	6:-- ea.
Grades 10-12	A 10-12 III	1:-- ea.
Geometry	G 10-12 I	6:--
Grades 10-12	G 10-12 II	4:--
	G 10-12 II-III; G 10-12 III	6:-- ea.
Calculus	F 11-12 I	7:--
Grades 11-12	F 11-12 II	7:--
Probability and Statistics		
Grades 10-12	S 10-12	7:--
Differential Equations - Grades 11-12	D 11-12	5:--

P. **SPECIFIC PLANS FOR EVALUATION OF MATERIALS:** Materials are taught in the schools on an experimental basis. Teachers then work out reports of their experiences. Some short tests on the common parts of experimental and traditional program have been set.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Teacher preparation will be handled by the governments in the respective countries when the new curricula are introduced.

R. **PROJECT ACTIVITIES SINCE MARCH 1965 REPORT:** The experimental teaching has continued. Some tests have been set. The Committee is now working on its final report.

S. **PLANS FOR THE FUTURE:** The experimental teaching will continue for some years. The final report will be published during the early part of 1967.

*Response made for 1966 Report.

A. PROJECT TITLE: THE SCANDINAVIAN PHYSICS PROJECT FOR THE MODERNIZING OF THE HIGH SCHOOL PHYSICS

B. PROJECT DIRECTOR: K.-G. Friskopp, Lansskolnämnden, Drottninggatan 29, Örebro, Sweden. Tel: 019/ 12 44 40.

C. PROJECT HEADQUARTERS:
- a. Address: Same as B. Contact Project Director.
- b. Facilities available for viewing: During the school year visits to the schools are possible.

D. PRINCIPAL PROFESSIONAL STAFF: A number of different persons have worked on the project at various times.

E. PROJECT SUPPORT:
- a. Organizational sponsorship: Formerly O.E.C.D., Paris.
- b. Funding agencies: The Governments in Finland, Norway and Sweden.

F. PROJECT HISTORY:
- a. Principal originators: E.S.I. and O.E.C.D.
- b. Date and place of initiation: 1961, Cambridge, G. B.
- c. Reason for initiation: A wish to have the PSSC-ideas presented for Scandinavian pupils.

G. PRESENT COMMERCIAL AFFILIATIONS: None described.

H. PURPOSES AND SPECIFIC OBJECTIVES: To renew school physics in the gymnasium (High School level) in Scandinavia on bases of the PSSC-physics program. The first Scandinavian edition followed fairly close the first American edition with an addition in quantum physics. The second Scandinavian edition, worked out in close cooperation with E.S.I., will contain most of the PSSC Advanced topics, but not so much PSSC part one.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Gymnasium physics dealing with all parts of physics; grades 10-12; age levels 16/17 - 18/19.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Fysikk I-IV, 1962-63 - Universitetsforlaget, Oslo, Norway.
2. Fysik I-V, 1962-65 - Biblioteksförlaget NKI, Stockholm, Sweden.
3. Fysik I, 1967 - Biblioteksförlaget, Stockholm.

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: 1, 3. 2 (out of print).

M. LANGUAGES IN WHICH MATERIALS WERE WRITTEN: First edition, Norwegian and Swedish. Second edition will appear in Finnish, Norwegian and Swedish.

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
- a. Number of teachers using materials: About 100.
- b. Some specific schools where course is being taught: Ekenäs, Samlyceum, Ekenäs, Finland; Oslo Teniske gymnas, Oslo, Norway; Rudbeckianska skolan, Västerås, Sweden.

P. MATERIALS PRESENTLY BEING DEVELOPED:

4. Some of the PSSC films are translated with aid from O.E.C.D.
5. (Some of the books in Science Study Series are translated, but not as a part of our program).

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The teacher training takes part within the ordinary program for teacher training in Scandinavia.

R. PROJECT EVALUATION: The evaluation of the first pilot course has not yet taken place. The teachers taking part in the pilot course meet once per year and during this meeting the experiences from the last school year are discussed.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Part II, Mechanics, and Part III, Electricity, are planned to appear in print in Swedish in 1967, and Part IV, Quantum Mechanics, in Swedish in 1968. The whole book will appear in Finnish and Norwegian in 1968. Laboratory Guide and Teachers' Guide will appear in 1967 and 1968. The evaluation of the first pilot course will take place late in 1967.

A. PROJECT TITLE: THE SPECIAL PROJECT STP-5/SP SCANDINAVIA FOR PILOT COURSES IN CHEMISTRY

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: The Royal Swedish Ministry of Education and Cultural Affaires and OECD Paris, France.

C. PROJECT DIRECTOR: None listed.

D. PROJECT HEADQUARTERS ADDRESS: Gustaf Åhman, The National Board of Education, Fack, Stockholm 22, Sweden.

E. PROFESSIONAL STAFF: Norwegian working group: Einar Wang Lund, Oslo, Chairman (Førsteamanuensis); Ingeborg Kvaal, Oslo (assistant master); Svein Solheimsnes, Bergen (senior master); Aage Spro, Oslo (head-master); Swedish working group: Ingemar Brodén, Karlstad, chairman (school inspector); Lennart Hultgren, Uppsala (school consultant); Axel Johansson, Stockholm (professor); Gunnar Kling, Stockholm (senior master); Gustaf Åhman, Stockholm, secretary (school consultant).

F. PROJECT SUPPORT:

a. Organizational sponsorship: The Ministry of Education and Cultural Affaires, Sweden.

b. Funding agencies: OECD, France, and the Ministry of Education and Cultural Affaires, Sweden.

G. SPECIFIC PURPOSES AND OBJECTIVES: To test new curricula and new textbooks through experimental teaching with a view to revising chemistry teaching in the participating countries (Norway and Sweden).

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Elementary chemistry.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. Textbooks for the pupils and guides for the teachers.
2. Lists of equipment and chemicals.
3. Tests.
4. Conclusions, questions and problems on completed courses.

J. USE OF PROJECT MATERIALS:

a. Number of teachers using complete program: School year 1965/66 - 10 Norwegian teachers and 15 Swedish teachers.

b. Some specific schools where course is being taught: Den norske ungdomsskolen (Oslo, Bergen), Norway and comprehensive schools in Värmland, Sweden.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Norwegian and Swedish.

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: The texts will be translated into English.

M. MATERIALS PRESENTLY BEING DEVELOPED:

5. Self-instructional materials (programmed instruction).

N. MATERIALS AVAILABLE FREE: None described.

O. MATERIALS PURCHASABLE: None described.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: The text will be evaluated by psychological experts during the school year 1966/67.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Two summer courses are designed to train teachers in modern chemistry teaching methods. The first was held in the summer of 1965, and the second in the summer of 1966.

R. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Not previously reported.

S. PLANS FOR THE FUTURE: At present no further details can be stated regarding the planning of the work.

A. PROJECT TITLES: STRUCTURAL MATERIAL FOR TEACHING MATHS TO INFANTS; MATHEMATICS FOR INFANTS; "NEW IDEAS" IN MATH FOR CHILDREN (AGE 12 - 15 YRS.).

B. PROJECT DIRECTOR: Sair Ali Shah, Institute of Education, University of the West Indies, St. Augustine, Trinidad, West Indies.

C. PROJECT HEADQUARTERS:
a. Address: Same as B. Contact Project Director.
b. Facilities available for viewing: Projects in progress at some schools.

D. PRINCIPAL PROFESSIONAL STAFF: Sair Ali Shah, Lecturer.

E. PROJECT SUPPORT: Institute of Education, University of the West Indies.

F. PROJECT HISTORY:
a. Principal originator: Institute of Education, University of the West Indies.
b. Date and place of initiation: September 1963, Trinidad, West Indies.
c. Reason for initiation: To introduce new concepts in maths to Primary and Secondary Schools.

G. PRESENT COMMERCIAL AFFILIATIONS: None described.

H. PURPOSES AND SPECIFIC OBJECTIVES: These projects are introduced with the following objectives: To introduce content in maths, so that there continuity from the Infant School through High School; and to use certain psychological principles for teaching mathematics, e.g., Piaget's Principles of Conservation, Reversibility; Werthermer's idea of 'Structural' Thinking.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Use of Cuisenaire Rods for Teaching Maths for Children - Topics: Four Operations (Addition, Subtraction, Multiplication, Division), Inequalities, Sentences, Numbers; Maths for Infants - Topics: Numbers, Shapes, Sets, Money, 'Along a Line', Covering a Surface, Occupying Space, Weight, Time; "New Ideas" for (12-15) - Topics: Numbers, Operations, Measurement, Variation, Sets, Matrices, Geometry, Trigonometry, Statistics.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. "Principles of Teaching Mathematics", published by Longmans, U. K.
2. "Ideas in Maths": Introduction, Numbers, Operations, Measurement, Variation (each in separate booklet).
3. Maths for Infants (First experimental material).

K. MATERIALS AVAILABLE FREE: For a few of Item 2 above, write to Sair Ali Shah, Project Headquarters.

L. MATERIALS PURCHASABLE: For Item 1 above, write to: Longmans, Green & Co., Ltd., 48 Grosvenor St., London W.1., United Kingdom. Price - $1.25 (U.S.).

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** None described.

O. **USE OF PROJECT MATERIALS:**
   a. Number of teachers using materials: Over 2,000 teachers.
   b. Some specific schools where course is being taught: All Teachers' Colleges in Trinidad. (Material used for training teachers); St. Joseph Convent, Port of Spain; St. Joseph Convent, St. Joseph (Trinidad); Primary Schools in Trinidad: Warrenville Presbyterian, Tunapuna E.C.

P. **MATERIALS PRESENTLY BEING DEVELOPED:**
   4. Material for Maths for Primary Schools.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Courses on Content and Methodology (Psychological Principles) for Inservice Teachers: For Infant Teachers, Content: Numbers, Shapes, Sets, Money, 'Along a Line', 'Covering a Surface', 'Occupying Space', Weight, Time; Methodology: 'Principles of Teaching Maths' (as in text); For All Primary School Teachers: "New Maths" Programme at Teachers Colleges; For Secondary School Teachers: Number Systems, Sets, Boolean Algebra, Linear Programming, Matrices, 'Motion Geometry'. Courses are given at the Institute of Education and centres in other islands (West Indies).

R. **PROJECT EVALUATION:**
   a. Instruments used: Attainment Test (constructed by using Psychometric methods).
   b. Control groups: Yes
   c. Feedback process: Analysis of data, used to plan programme, e.g. Maths for Infants.
   d. Behavioral objectives identified: For infants, problem solving needs attention, that is, the application of mechanical skills to problems; At Teacher training level, the attitude of teachers needs attention.
   e. Research evidence of objectives achieved: Data on use of Cuisenaire rods. (This is a control expt.).
   f. Other pertinent information: Previous research done on "Attitude of Teachers to Science at Teachers Colleges in Trinidad"; Indications from purely exploratory talks, that similar need is required for mathematics.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Preparation for Report on Expt. with Infants Re-structural Material; Development of programme "Maths for Infants"; Inservice Course for Secondary School Teachers.

T. **PLANS FOR THE FUTURE:** Seminar, April 1967, for Secondary School teachers; Seminar to include: Chemistry, Physics, Zoology, Botany, Maths; Aim: to discuss some new topics included in the Secondary School curriculum; Preparation of Infant School Maths (May, June, July 1967).

A. PROJECT TITLE: MOBILE UNITS FOR SCIENCE TEACHING*

B. PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION: Executive Committee. Mobile units were prepared in cooperation with OECD during the 1963-64 academic year.

C. PROJECT DIRECTOR: Rauf Nasuhoğlu, Chairman of the Committee.

D. PROJECT HEADQUARTERS ADDRESS: General Directorate of Educational Aids and Technical Cooperation, Ministry of Education, Ankara, Turkey.

E. PROFESSIONAL STAFF: Rauf Nasuhoglu, Dean of the Faculty of Sciences, Ankara University; Bahattin Ornekol, Vice Chairman Physics Department, Gazi Teacher College, Ankara; Mehmet Bertan, Science Teacher, and Division Director, of the General Directorate of Educational Aids and Technical Cooperation, Ministry of Education; and two trained science teachers are in charge of guiding the teachers in the pilot project area.

F. PROJECT SUPPORT:

a. Organizational sponsorship: Ministry of Education, Turkey.

b. Funding agencies: Ministry of Education, Turkey Committee of Scientific and Technical Personnel, OECD.

G. SPECIFIC PURPOSES AND OBJECTIVES: In-service training for science teachers; and to make use of science materials in more schools, especially in areas where such materials are not readily available or non-existent.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Physics - Grade Level: Junior High School and High School.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:

1. Physics materials provided by OECD and the Ministry of Education from abroad.
2. Materials used in this project are as follows:
Five Experiment Boxes; Modern physics materials supplied by OECD from different firms and countries; Supplemental materials from the center for instructional aids production of Turkey; Some simple physics materials produced by students using UNESCO publications for guidance.

J. USE OF PROJECT MATERIALS: 42 science teachers in the pilot project area in the Province of Elazig, eastern part of Turkey, are using the complete program. The materials are being used in 14 secondary schools enrolling 3,652 students. About 90% of the classes were provided with experiments this year as against virtually none in previous years.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Materials were originally in German, French and English. They were translated into Turkish and distributed to the teachers in the pilot project area.

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None described.

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: Over 2,000 teachers.
   b. Some specific schools where course is being taught: All Teachers' Colleges in Trinidad. (Material used for training teachers); St. Joseph Convent, Port of Spain; St. Joseph Convent, St. Joseph (Trinidad); Primary Schools in Trinidad: Warrenville Presbyterian, Tunapuna E.C.

P. MATERIALS PRESENTLY BEING DEVELOPED:
   4. Material for Maths for Primary Schools.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Courses on Content and Methodology (Psychological Principles) for Inservice Teachers: For Infant Teachers, Content: Numbers, Shapes, Sets, Money, 'Along a Line', 'Covering a Surface', 'Occupying Space', Weight, Time; Methodology: 'Principles of Teaching Maths' (as in text); For All Primary School Teachers: "New Maths" Programme at Teachers Colleges; For Secondary School Teachers: Number Systems, Sets, Boolean Algebra, Linear Programming, Matrices, 'Motion Geometry'. Courses are given at the Institute of Education and centres in other islands (West Indies).

R. PROJECT EVALUATION:
   a. Instruments used: Attainment Test (constructed by using Psychometric methods).
   b. Control groups: Yes
   c. Feedback process: Analysis of data, used to plan programme, e.g. Maths for Infants.
   d. Behavioral objectives identified: For infants, problem solving needs attention, that is, the application of mechanical skills to problems; At Teacher training level, the attitude of teachers needs attention.
   e. Research evidence of objectives achieved: Data on use of Cuisenaire rods. (This is a control expt.).
   f. Other pertinent information: Previous research done on "Attitude of Teachers to Science at Teachers Colleges in Trinidad"; Indications from purely exploratory talks, that similar need is required for mathematics.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Preparation for Report on Expt. with Infants Re-structural Material; Development of programme "Maths for Infants"; Inservice Course for Secondary School Teachers.

T. PLANS FOR THE FUTURE: Seminar, April 1967, for Secondary School teachers; Seminar to include: Chemistry, Physics, Zoology, Botany, Maths; Aim: to discuss some new topics included in the Secondary School curriculum; Preparation of Infant School Maths (May, June, July 1967).

M. **ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED:** None listed.

N. **MATERIALS AVAILABLE FREE:** None

O. **MATERIALS PURCHASABLE:** These materials are being supplied to schools by the government of Turkey, and the departments concerned pay the cost. Presently materials developed by the Center in Turkey are only being made for schools in Turkey and are not being sold abroad.

P. **SPECIFIC PLANS FOR EVALUATION OF MATERIALS:** Materials are being evaluated by the Executive Committee. The project will continue next year in the same area, and if it continues to be useful it will be expanded to the other areas.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** In-service training courses are being held every year for science teachers in various parts of Turkey. Duration of the courses varies from two to three weeks.

R. **PROJECT ACTIVITIES SINCE MARCH 1965 REPORT:** Not previously reported.

S. **PLANS FOR THE FUTURE:** Project will be expanded into other areas. At present, indications are that it will be more profitable if additional funds are available. When the pilot project is over the State Planning Agency is planning to make it a national project.

*Response made to 1966 Report.

A. PROJECT TITLE: TURKISH MINISTRY OF EDUCATION NATIONAL SCIENCE LISE PROJECT

B. PROJECT DIRECTORS: Rauf Nasuhoğlu, Turkish Co-Director; D. Murray Alexander, American Co-Director.

C. PROJECT HEADQUARTERS:

a. Address: Fen Lisesi Projesi, P. K. 92, Bakanliklar, Ankara, Turkey. Tel: Ankara 134239. Contact the Co-Directors.

b. Facilities available for viewing: A specially designed science high school with modern laboratory and classroom equipment, and with boarding facilities for 300 boys and girls selected by national competition.

D. PRINCIPAL PROFESSIONAL STAFF: In U.S.A.: J. S. Marshall, P. R. Fordyce, Florida State University; In Turkey: (Mathematics) S. Suray, B. Yurtsever, of Ankara University; T. Taner of Middle East Technical University; (Biology) S. Okay of Ankara University; (Chemistry) B. Baysal, V. Enüstün of Middle East Technical University; (Physics) R. Nasuhoglu of Ankara University; A. Saplakoglu of Middle East Technical University; Consultants: D. Murray Alexander; W. V. Houser.

E. PROJECT SUPPORT:

a. Organizational sponsorships: Ministry of Education, Republic of Turkey, The Florida State University.

b. Funding agencies: Ministry of Education, Republic of Turkey, The Ford Foundation.

F. PROJECT HISTORY:

a. Principal originators: A Ministry of Education Committee of scientists and educators, chaired by Osman Ülkümen, then Director General of Secondary Education.

b. Date and place of initiation: April 1962; Ankara, Turkey.

c. Reason for initiation: Concern by the scientific community for future scientific manpower in Turkey.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To establish a modern science high school for the gifted students of Turkey; to adapt modern curriculum materials for use in Turkish and to educate teachers in the use of these materials. Thereafter, to extend the benefits of this type of science education to other schools in Turkey.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: To upgrade courses in all subjects, but with particular emphasis on science and mathematics; the last three years of secondary school; about 15-17 years.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: Translations and adaptations of BSCS biology, CHEMS Chemistry, PSSC physics, SMSG mathematics, with appropriate advanced topics for the final year in each subject.

K. MATERIALS AVAILABLE FREE: In preliminary form--not available.

L. **MATERIALS PURCHASABLE:** Will become purchasable later through Ministry of Education Publishing Office.

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** Turkish

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** Not applicable.

O. **USE OF PROJECT MATERIALS:**
   a. Number of teachers using materials: To some degree, about 200.
   b. Some specific schools where course is being taught: Fen Lisesi, Ankara; Bahcelievler Deneme Lisesi, Ankara.

P. **MATERIALS PRESENTLY BEING DEVELOPED:** Advanced topics for biology, chemistry, physics and mathematics.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Summer institute programs for science and mathematics teachers at Fen Lisesi, Ankara.

R. **PROJECT EVALUATION:** Evaluation by Educational Testing and Research Bureau, Ankara.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not previously reported.

T. **PLANS FOR THE FUTURE:** Establishing framework for continuing science educational development in Turkey.

SYNOPSES

Many worthy curriculum efforts around the world have undoubtedly gone unreported due to various delays, publishing deadlines, or lack of contact. Still others are only in the preliminary stages of development. The following synopses, drawn from clearinghouse reports and various other sources, are representative of such activities.

Australia

I. Some recent developments in both Science and Mathematics have been reported by the Director of Education, Adelaide, South Australia. An initial syllabus for Grades I and II Mathematics has been produced and was used in pilot schools in 1966. General adoption in all schools is expected in 1967. A draft syllabus for Mathematics in Grades III and IV has also been prepared. This material, written by a team of teachers at Raywood, has been revised and edited by the Curriculum Development Officer and Mr. E. W. Golding. The draft syllabus is to be tried in pilot schools in 1967. In the Technical High Schools both new science and mathematics courses have been introduced. The Superintendent of Technical Schools can provide detailed information. In the High Schools the new Alternative Course contains sections on both Science and Mathematics. The Superintendent of High Schools can furnish information. In the Area Schools revisions of syllabuses in both Science and Mathematics were made in 1965. The Superintendent of Rural Schools can supply details.

II. The Nuclear Research Foundation within the University of Sydney has produced a series of science textbooks for high school students and teachers. The books are designed to fit the Wyndham pattern of education operating in New South Wales. Under this scheme the secondary schools course is usually begun at the age of 12 and continues to the age of 18. It is split into two - a period of four years (12 to 16) followed by a further period of two years (16 to 18). The School Certificate examination is given at the end of the first four-year period. The course of the Nuclear Research Foundation has been developed to cover both periods. The books were prepared by university and college teachers, school inspectors and high school science teachers under the leadership of Prof. H. Messel, Head of the School of Physics and Director of the Nuclear Research Foundation within the University of Sydney. The material which covers the first four-year period is titled Science for High School Students and constitutes a truly integrated course of science in which the subjects of astronomy, physics, chemistry, biology and geology are treated as a whole. The text is available in a single volume edition or a two volume edition. If material for O-level only is desired, there is a two volume Abridged Science for High School Students. For the two year period after the School Certificate examination, the text Senior Science for High School Students is divided into three volumes: Part 1 - Physics, Part 2 - Chemistry, and Part 3 - Biology, each of which is interlocked with one another and all of which are linked with the text of the first four years. Teachers' Manuals are available for each series. The project has proven very successful and the textbooks are in wide use throughout Australian schools. The Foundation textbook groups will carry out amendments and adaptations as the need arises. Commercial editions of the textbooks are available from V. C. N. Blight, the N.S.W. Government Printer, Box 4050, G.P.O., Sydney, N.S.W., Australia.

III. The Curriculum and Research Branch of the Education Department of Victoria, Australia is developing a primary science course for all levels, that is from the beginners (age about 5 years) to grade 6 (age 11 years). The branch is part of the State Education Department and all funds are from this source.

The formal control of the course development is in the hands of a departmental committee, which includes class teachers, head teachers, school inspectors and a teachers' college lecturer. The actual preparation of both theoretical and trial materials is done by members of the Curriculum and Research Branch, including teachers with science qualifications and primary school specialists. There are no other specialists on the project, but advice has been obtained from psychologists in the Education Department, and psychologists and scientists of Melbourne University. The existing course in the Department schools is in "Nature Study", but many teachers have experimented with science courses and information has been collected from many of them. Work on the present project began in February 1965.

Science is viewed by the course designers as consisting, fundamentally, of the process of forming verifiable ideas about the material world. The early years are spent in sense-training activities, discrimination and classification exercises, manipulation of materials around the theme of interactions leading to change, experiences with changes occuring with time, conservation and properties of matter. It is regarded as important that children's particular interests are followed up where possible with a variety of similar material to assist in concept formation. In the latter years experiences are grouped around what are regarded as the major ideas of science - such as evolution, particle theory - but these abstractions are not dealt with anywhere in the primary school. Problem sensing as well as problem solving skills are stressed in the material.

In general, particular processes are not taught as such, and their conscious use is preceeded by their use in a casual way as required by the activities. The role of language is stressed as essential in the formation and understanding of concepts. So far about 30 units, as well as a complete infant school guide, have been prepared. After preliminary trials in 1965 and 1966 these will be rewritten and made available for wider experimental use.

The Victorian Education Department covers 1,928 primary schools, which are attended by almost 334,000 children. The number of primary school teachers is just over 14,000. Another 118,000 children attend non-state schools, most of which follow courses similar to those of the Education Department. The eight primary teacher training colleges are attended by 3,800 students (all figures are 1966).

In-service training so far has been limited to those teachers in trial schools, and some attempt to spread the thinking behind the proposed courses among teachers. Teachers of the trial schools are frequently visited by Curriculum and Research Branch officers, staff discussions are held, and central meetings of groups of teachers at various levels have been organized. Material on current developments has been circulated to teachers' college lecturers and school inspectors. It is hoped that an appropriate atmosphere in which to initiate the teaching of the new course and intensive in-service training is being developed. Correspondence should be directed to R. W. Cowban, Curriculum Officer, Curriculum and Research Branch, Education Department, 107 Russell Street, Melbourne, C. I. Victoria, Australia.

France

IV. The American School of Paris is offering a new course in physical science designed to show the relationship between the sciences and other fields of human activity including philosophy, religion, art, history, music and government. Along with the texts, supplemental readings, and laboratory, various lectures and discussions are presented by invited resource persons. Correspondence should be directed to David A. Sousa, American School of Paris, 8 rue de la Machine, 78 - Louveciennes, France.

V. The French Ministry of Education reports that it is following its usual program of purchasing and distributing selected pieces of science equipment to schools through the auspices of the Equipment Center for Scientific Material, National Pedagogical Institute, 4, rue de Irlandais, Paris V, France. No new projects are envisioned.

Germany

VI. The curriculum study described here was started some time ago in the Institut für Bildungsforschune in der Max-Planck-Gesellschaft, Blissestr 2. 1 Berlin 31, Germany. The study is conducted by the Department of Education and Psychology (Dr. S. B. Robinsohn, Director), and is headed by Dr. Doris Knab. In the Federal Republic of Germany, as in other countries, there is not only a widely-felt need to revise the curriculum, especially that of the secondary schools, but there is also needed an instrument which will allow curriculum-makers to decide upon aims and contents in a more rational and systematic manner than what appears to be current practice. Thus, the aim of the study is twofold: to set in motion the revision of a particular curriculum (i.e., that of the secondary schools, at the "Abitur" [graduation] level), and at the same time, to develop an instrument to be used in further revision of this or some other curriculum.

Starting from a systematic analysis of the whole body of theorizing, criticism, and suggestions which has gathered round the present curriculum (issues dealth with by what is called General and Special Didactics in German educational literature), the study proceeds to confront the results of this analysis: (1) with the educative substance of the academic disciplines; (2) with the qualifications for professional careers, as well as certain other qualifications needed to cope with the demands of social, political, and cultural life; (3) with the findings of the social and anthropological sciences as to objectives and conditions of the educative process. The program for the investigation consists of four separate, but interrelated enquiries. Following the identification of the whole range of content-elements discussed under the general heading of secondary school "didactics", together with the reasons offered for adding them to, keeping them in, or withdrawing them from, the current curriculum (enquiry no. 1), these materials are used in the construction of questionnaires, which are to be submitted to systematic and reasoned evaluation by panels of subject-matter experts in the respective fields. The aim is to arrive at a reasoned catalogue of content-elements and qualities to be sought for in a new curriculum. The third enquiry is to ascertain operations actually performed by professional men in the course of their work, and qualities actually needed in coping with the demands of social, political, and cultural life. The enquiry is directed at people representing careers typically chosen by graduates with "Abitur" qualifications, and at others outside the work-situation. Finally, in order to obtain information about the conditions limiting and controlling the achievement of desired educational outcomes, a fourth enquiry is directed at representatives of the anthropological sciences. This group, which will include educational scientists, is also expected to make suggestions regarding the content-elements their disciplines contribute to the curriculum.

The data gained from these enquiries are, in the final stage of the study, to be compared and analyzed, with an explicit curriculum theory serving as a frame of reference, so as to result in a number of alternative solutions to the initial problem of revising the secondary school curriculum.

Great Britain

VII. The Association for Science Education (ASE) of Britain has been concerned with various elementary and secondary school developments in science. In addition to various policy statements, the Association has produced several recent publications of considerable value to science teachers. These works are available through John Murray, 50 Albemarle Street, London, England. Inquiries concerning ASE should be directed to Mr. E. W. Tapper, Secretary, Association for Science Education, 52 Bateman Street, Cambridge, England.

VIII. A Centre for Curriculum Renewal and Educational Development Overseas (CREDO) has been set up to help developing countries with their own programs of educational innovation, by making readily available to them the relevant knowledge and experience which now exists in Britain. It will aim, among other things, to assist curriculum development projects in such countries; to make available basic teaching materials for adaptation to the particular circumstances of the country concerned; to help with the provision of specialist training for members of national curriculum development units; and to help in the staffing of teachers' conferences, workshops and in-service training programmes linked with such work. Additional information may be obtained by contacting Mr. Robert W. Morris, Director, CREDO, Tavistock House South, Tavistock Square, London, W. C. 1, England.

IX. The Schools Council for the Curriculum and Examinations--or the Schools Council, as it is now generally called--grew out of a recognition by all branches of the education service that cooperative machinery was needed to organize a more rapid, and more effective, response to change. Based on the recommendations contained in the Lockwood Report of 1963, the Secretary of State for Education and Science established the Schools Council, which held its first meeting in October of 1964. The Council will keep under review curricula, teaching methods and examinations in primary and secondary schools, including aspects of school organization so far as they affect the curriculum, and will draw attention to difficulties arising in those fields which appear to merit consideration by the appropriate authorities. In the areas of science and mathematics, much work of the kind which the Council exists to sponsor was already in hand when the Council first met, due to project activity of the Nuffield Foundation (described elsewhere in this Report). A close and harmonious working relationship was established between the Council and the Foundation for joint sponsorship of projects. Essentially the Nuffield teams are wholly responsible for the development of teaching materials, while the Council, apart from acting as one among a number of sources available to the Nuffield teams, provides field services (e.g., arranging for volunteer schools and local education authorities to try out the Nuffield materials; arranging courses and conferences) and evaluation. One of the more recent projects established by the Schools Council is the Pilot Development Project in Applied Science and Technology. The pilot project team is considering the place of the teaching of technology, both to scientists and non-science specialists, in the curriculum as a whole. The project will culminate in a report to the Schools Council, the aim of which is to clear what needs to be done to enable schools in general, if they wish, to modify their science teaching in the direction of applied and engineering work and thus help the Council to decide whether, and if so in what form, development work in this field should be pursued. The project is further described in Field Report No. 3 Technology in Schools.

This and other publications describing the work of the Schools Council are available from Schools Council, 38 Belgrave Square, London S. W. 1, England.

X. A series of mathematics textbooks for the ages 11-15 has been produced in the St. Dunstan's College Syllabus. Two-thirds of the syllabus is traditional material treated with an up-to-date approach with emphasis on relevant applications. The texts may be supplemented by a series of booklets which contain the contemporary aspects of mathematics. The books are published by Edward Arnold (Publishers) Ltd. Additional information may be obtained from A. J. Sherlock, Head of Mathematics Dept., St. Dunstan's College, Catford, S. E. 6 London, England.

Iraq

XI. A program in the Model Primary Schools of Baghdad seeks to encourage teachers to use practical experiences in the development of their science courses whenever possible. An example of such a unit is that of raising silkworms and honey bees on school premises. Started by Mr. Jasim Al-Hassoon, Inspector of Model Schools, the project is now directed by science teachers, at Al-Hareery Model School, Hareery Street, Baghdad, Iraq.

Israel

XII. A Study of New Approaches to the Teaching of Elementary Science and Their Adaptation to Schools in Israel is in its early stages. Several topics for a pilot experiment in selected classes have been started. The materials will be in Hebrew. The project director is Meir Feuchtwanger, Physics Department, Tel Aviv University, Tel Aviv, Israel.

Jamaica

XIII. A new Physics and Mathematics Centre has been established at the University of the West Indies, Kingston, Jamaica. Its purpose is the improvement of physics and mathematics teaching in Jamaican schools through curriculum development, teacher education, and the loan of equipment and films. The center will be under the directorship of Keith W. Warren.

Japan

XIV. A group at the University of Tokyo including members from the various departments such as physics, electrical engineering, mechanical engineering, and chemical engineering are developing a standard curriculum to be used in basic courses of engineering education at second and third year levels of college. Textbooks will be prepared in a year or two. Preliminary reports in Japanese or English are available from Prof. Takashi Mukaibo, Chairman, Department of Industrial Chemistry, University of Tokyo, Tokyo, Japan.

NSF

XV. The National Science Foundation has produced a list of Translations and Adaptations of Instructional Materials for Other Countries. The purpose of the list is to give the status of translations and adaptations for use in other countries of textbooks and other printed materials and of educational films produced originally by U. S. course and curriculum improvement projects. The Foundation also issues a list of definitive U. S. editions of textbooks and other printed instructional materials and a list of films and kinescopes developed by U. S. course and curriculum projects it has supported. These lists can be obtained from the Course Content Improvement Program, Pre-College Education in Science, or the Science Curriculum Improvements Program, Undergraduate Education in Science, National Science Foundation, Washington, D.C. 20550.

OECD

XVI. The Organization for Economic Cooperation and Development (OECD) has in the recent past sponsored a number of science curriculum reform projects in the Member countries, usually pilot-projects, in which a new sicence or mathematics curriculum was tried out in a limited number of schools. The production of new textbooks, the in-service training of teachers, the production of new teaching aids, etc. formed part of these projects. Apart from this, a number of international seminars and working sessions had been organized, where the implications on teaching of new developments in the sciences were defined. Nearly all these projects have now been completed. Recently, a report (Modernizing Our Schools - A Report on Curriculum Improvement and Educational Development) was published by OECD in which the conclusions from the past work are drawn and the principles of future policy and action are outlined. Other published works which may prove of interest to science and mathematics educators include the following: New Thinking in School Mathematics; Synopses for Modern Secondary School Mathematics; Mathematics Today: A Guide for Teachers; New Thinking in School Chemistry; Chemistry Today: A Guide for Teachers; School Chemistry: Trends in Reform--Selected Topics; A Modern Approach to School Physics; Teaching Physics Today: Some Important Topics; New Thinking in School Biology; Biology Today--Its Role in Education; Policy for School Science: Countries with Special Problems of Basic Educational Development; Supply, Recruitment and Training of Science and Mathematics Teachers; Mathematics for Physicists and Engineers; Engineering Education in the Computer Age; Mathematics and Engineering Applications; Mathematical Education of Engineers; Country Reports on the Education, Training and Functions of Technicians (United Kingdom; France) These titles are available in both English and French. In the United States, contact OECD Publications Center, Suite 1305, 1750 Pennsylvania Avenue, N. W., Washington, D.C. 20006. In Europe write Directorate for Scientific Affairs, Publication Unit, OECD, 2 rue Andre-Pascal, Paris-16^{e}, France.

Pakistan

XVII. In addition to the East Pakistan Educational Equipment Development Bureau (described elsewhere in this Report) there is a similar center that has been operating in West Pakistan since 1964. Its Project Director is Mr. S. Naseem Ahmed and the Center's address is: West Pakistan Educational Equipment Technical Assistance Center, Gulberg III, Lahore, West Pakistan.

Portugal

XVIII. A Project for a Modern Teaching of Chemistry in Secondary Schools has been started in Portugal under the directorship of Fernando Pinto Coelho, The Chemical Laboratory, University of Coimbra, Portugal. Similar projects from abroad are being examined and secondary school teachers will shortly be supplied with material for study and discussion in preparation for development of pilot text, laboratory and teachers' books.

Spain

XIX. The Canary Islands Mathematics Project (CIMP) is developing a program for pupils 6-14 years old and a short course for new teachers. Information will be published in a bulletin series written in Spanish. Further information may be obtained from the project director, Prof. Julian B. Capanos Morata, Dr. Fleming - 10 (Escaleritas), Las Palmas de Gran Canaria, Canary Islands, Spain.

UNESCO

XX. A UNESCO Pilot Project for the Improvement of Mathematics Teaching in the Arab States is designed to get underway in 1969 and 1970. Problems of mathematical education in the secondary school will be the focus of the project. UNESCO will first assist each country in the formation of a National Study Group, representing all segments of the mathematics community in that country. These groups will help to create a receptive climate for changes in mathematics education, coordinate and centralize mathematics curriculum improvement efforts and promote teacher education for the new curricula. An International Working Group will be established to produce textual materials, teachers commentaries, and other aids to be used in experimental classes. The team will consist of university teachers and professional educators from the participating Arab countries. Finally, it is hoped an Arab States Committee for the Modernization of Mathematical Education will be set up in 1970 to coordinate activities with trial materials, teacher education, and evaluation for revisions and final textbook versions. The Committee will be responsible for promoting the standardization of curricula and textbooks in the Arab world in order to ensure unity of orientation and language. Further information may be obtained from the Science Teaching Division, UNESCO, Place de Fontenoy, Paris 7^e, France.

A. PROJECT TITLE: AAAS COMMISSION ON SCIENCE EDUCATION

B. PROJECT DIRECTORS: John R. Mayor and Arthur H. Livermore, American Association for the Advancement of Science, 1515 Massachusetts Avenue, N.W., Washington, D.C. 20005, Tel. 202-DU 7-7171

C. PROJECT HEADQUARTERS:
a. Address: American Association for the Advancement of Science 1515 Massachusetts Avenue, N.W., Washington, D.C. 20005, Contact: Dr. John Mayor
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Edwin B. Kurtz, Jr., Assistant Director in charge of Teacher Education and Henry H. Walbesser, Assistant Director in charge of Evaluation

E. PROJECT SUPPORT:
a. Organizational sponsorship: American Association for the Advancement of Science
b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
a. Principal originator: American Association for the Advancement of Science
b. Date and place of initiation: 1962, Washington, D.C.
c. Reason for initiation: To improve science education

G. PRESENT COMMERCIAL AFFILIATION: Xerox Corporation

H. PURPOSES AND SPECIFIC OBJECTIVES: The Commission has broad concerns for science education at all grade levels - kindergarten through college. It is also concerned with the role of science in vocational education and in out-of-school science experiences. In addition, it is concerned about the relation between the new course developments in the natural sciences and the social sciences.

The Commission has agreed to assist course content projects through conferences, communication and exchange of materials as the need arises among the various groups working in this area.

Assistance to schools introducing new science programs is another task that the Commission has accepted. A study of the costs of introducing new science programs in the elementary grades is currently underway.

In a recent re-evaluation of its role in science education, the Commission agreed to place particular emphasis on the following areas:

1. Developing a new science program for junior high school.
2. Encouraging the development of new programs for the training of teachers, and possibly engaging actively in developing a teacher education program.
3. Assisting in determining the role of science in programs of vocational and technical education in high schools and junior colleges, and in introducing more technical work as a part of liberal education at all levels.

4. Improving the understanding of science through out-of-school activities.
5. Extending science education downward into the pre-kindergarten years.

To disseminate information about curriculum developments both in this country and abroad, it sponsors a clearinghouse of information. It also arranges meetings of administrators to inform them about new science projects.

I. SPECIFIC SUBJECTS AND GRADE LEVEL: The Elementary science materials written to date are for kindergarten through sixth grade. The subject matter is drawn from various fields in science.

To encourage the improvement of science education in the early grades, the Commission is preparing and evaluating the materials described below.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: Science--A Process Approach in seven volumes plus Commentary for Teachers:

1. Part One - Publication #65-14 - 24 exercises
2. Part Two - #65-15 - 26 exercises
3. Part Three #65-16 - 26 exercises
4. Part Four - #65-19 - 26 exercises
5. Part Five - #66-16 - 26 exercises
6. Part Six - #66-18 - 24 exercises
7. Part Seven - #66-21 - 23 exercises
8. Commentary for Teachers #65-22
9. Guide for the Instructor of a Teacher Education Program
10. The Process Instrument - #65-25
11. Competency Measures Parts One and Two - #65-26-1-2
12. Competency Measures Parts Three and Four - #65-26-3-4
13. Competency Measures Part Five - #66-23
14. Competency Measures Part Six - #66-26
15. Competency Measures Part Seven - #66-29
16. The Psychological Bases of Science--A Process Approach-#65-8
17. An Evaluation Model and Its Application - Science--A Process Approach - #65-9
18. Science Education News - November, 1963 - Description of the Program
19. Newsletter - Volume 1, three issues, December 1964 to May 1965; Volume 2, four issues, October 1965 to June 1966; Volume 3, Number 1, December 1966.
20. "Research in Science Education", H. A. Smith, Journal of Research in Science Teaching, Vol. 1, Issue 3, pp. 199-225 (1963)
21. "Curriculum Evaluation by Means of Behavioral Objectives", Henry H. Walbesser, Journal of Research in Science Teaching, Vol. 1, pp. 296-301 (1963)
22. "AAAS Commission on Science Education", Arthur H. Livermore, Journal of Research in Science Teaching, Vol. 2, pp. 271-282 (1964)
23. "Help Stamp Out Non-Behavioral Objectives", Edwin B. Kurtz, Jr., The Science Teacher, Vol. 32, No. 1 (1965)
24. "Elementary Science: A New Scheme of Instruction", Robert M. Gagné, Science, Vol. 151, pp. 49-53 (1966)

25. "Science Curriculum Evaluation: Observations on a Position", Henry H. Walbesser, The Science Teacher, Vol. 33, No. 2 (1966)
26. "Study of Science and Mathematics Programs in the Elementary School", John R. Mayor and Henry H. Walbesser, Jr., American Mathematical Monthly, Vol. 73, No. 3, March (1966)
27. "AAAS Commission on Science Education - Elementary Science Program", Arthur H. Livermore, Journal of Chemical Education, Vol. 43, p. 270, May (1966)
28. Films - one showing an exercise being taught in a sixth grade class; the other a teacher training film called "Confrontations in Teaching".
29. Equipment kits for Parts One through Seven

K. MATERIALS AVAILABLE FREE:

9. Guide for the Instructor of a Teacher Education Program
16. The Psychological Bases of Science--A Process Approach
19. Newsletter
21, 22, 23, 24, 25, 26, 27 (limited number of reprints)

L. MATERIALS PURCHASABLE:

1.	Part One	$2.25
2.	Part Two	$2.25
3.	Part Three	$2.25
4.	Part Four	$2.25
5.	Part Five	$2.25
6.	Part Six	$2.25
7.	Part Seven	$2.25
8.	Commentary for Teachers	$3.50

11. Competency Measures Parts One and Two - $1.50
12. Competency Measures Parts Three and Four - $1.50
13. Competency Measures Part Five - $3.50
14. Competency Measures Part Six - $3.50
15. Competency Measures Part Seven - $3.50
20. "Research in Science Education" - Reprints may be purchased from John Wiley and Sons, Inc., 605 Third Ave., New York 16, N.Y.
29. Equipment kits for Parts Four and Five. Kit for Part Four may be purchased from Ideal School Supply Company of Oak Lawn, Illinois; and kit for Part Five from Macalaster Scientific Corporation of Waltham, Mas. Prices on request from the companies listed.
31,32. The commercial edition of the first three parts and the accompanying kits of equipment and supplies may be purchased from Xerox Corporation.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No translation planned at present.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: From the sale of multiple copies of the books, we estimate that over 5,000 teachers are teaching the program.
b. Some specific schools where course is being taught: The

materials are being taught and evaluated in the following schools: Iola Frans School, Lineweaver School, Sewell School, Tucson, Ariz. Plantation School, Bakersfield, Calif.; Murray School, Groves School, Vieweg School, Desert Park School, China Lake, Calif.; Thomas Jefferson School, Wasco, Calif.; Bond Elementary School, Kate Sullivan School, University School, Tallahassee, Florida; North School, Glencoe, Ill.; The Laboratory Schools, University of Chicago; Harding School, Willits Elementary School, Lincoln School, Garfield School, Monmouth, Ill.; Nall Hills School, Valley View School, Overland Park, Kan.; Leith Walk Elementary School #245, Yorkwood Elementary School #219, Columbus Elementary School #99, Baltimore, Md.; Enfield School, Belle Sherman School, Caroline School, Henry St. John School, Northeast School, Central School, South Hill School, Ithaca, N. Y.; Colonial School, Prospect Hill School, Siwanoy School, Pelham, N. Y.; Duniway School, Rice School, Skyline School, Vestal School, Couch School, Portland, Ore.; R. S. Walton Public School, Philadelphia, Pa.; Casis Elementary School, Austin, Tex.; Roxhill School, Sacajawea School, Sand Point School, Seattle, Wash.; H. B. Patch School, Omro, Wis.; Emmeline Cook School, Oshkosh, Wis.

P. MATERIALS PRESENTLY BEING DEVELOPED:

30. Several films of classes using the program.
31. A commercial edition of the first three parts, to be identified as Part A, Part B, and Part C.
32. Revised kits of equipment and supplies to go with Parts A, B, and C.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A teacher education program is being developed which has a behavioral basis, including evaluation. The program includes instruction of the teacher in the science processes and classroom instructional strategies. The behaviors which teachers are to be able to demonstrate at the completion of the program are sequenced in a behavioral heirarchy which has been constructed and is being tested.

The Commentary for Teachers is a self-instructional text, mostly in regard to the science processes, classroom use of behavioral objectives, and background papers on science content. The Instructor's Guide is a set of instructional materials for the leader of the teacher education program in a school system.

It is anticipated that the commercial publisher of Science--A Process Approach will provide assistance to school systems in conducting teacher education programs.

R. PROJECT EVALUATION:

a. Instruments used: Competency Measures for each exercise; Process Instrument - Annual progress assessment; Teacher process measure

b. Control groups: Yes, for the Process Instrument Assessment, both student and teacher measures.

c. Feedback process: A six page feedback form is completed by the teacher at the completion of each exercise taught.

d. Behavioral objectives identified: Yes, they are described at the beginning of each exercise.

e. Research evidence of objectives achieved: Assessment for each exercise taught for the four years of the project 1963 - present by each teacher.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: A writing conference was held for seven weeks at the University of Maryland during the summer of 1966. The writers were college and university scientists, elementary school teachers and administrators. Parts 5, 6, and 7 were revised and the revised exercises were tried out in demonstration classes. The evaluation materials were revised and new kits of equipment were designed. A new teacher training program was developed and tested in a 10-day session with teachers from the 14 tryout centers and about 20 other school systems.

A 10-day conference on the future of science education was held at Dartmouth University in July 1966. A report of the conference is being prepared.

A study on the costs of introducing new science programs into elementary schools is being carried out. A report of this study will be published.

Two 3-day conferences on Frontiers in Science for School Superintendents were sponsored jointly with the American Association of School Administrators.

The Education Division of Xerox Corporation has been selected as the publisher of Science--A Process Approach. The first three parts, now identified as A, B, and C, are being prepared for publication. Printed materials and kits of equipment and supplies will be available from Xerox for use in schools in the fall of 1967.

T. PLANS FOR THE FUTURE:

1. In collaboration with the American Association of School Administrators, two seminars for school administrators will be held.
2. A study of the effects on students and teachers of the new high school programs in science and mathematics will be carried out.
3. A study of the role of science in technical and vocational education and of technical education as a part of liberal education will be started.
4. A conference on teacher education will be held and plans will be made for ways in which teacher education may be improved.
5. Consultants will be provided to schools and colleges interested in improving their science programs.
6. Attention will be given to ways of improving science education through out-of-school experiences.
7. The clearinghouse of information about science curriculum developments in the United States and abroad under the direction of Dr. J. David Lockard, will be continued.
8. Present plans are that Parts D and E of Science--A Process Approach will be published in 1968, and Parts F and G in 1969.

A. PROJECT TITLE: ANTHROPOLOGY CURRICULUM STUDY PROJECT (ACSP)

B. PROJECT DIRECTOR: Dr. Malcolm Collier, 5632 Kimbark Avenue, Chicago, Illinois 60637, Tel. 312-493-4620

C. PROJECT HEADQUARTERS: 5632 Kimbark Avenue, Chicago, Illinois 60637 Tel. 312-493-4620, Contact: Dr. Collier

D. PRINCIPAL PROFESSIONAL STAFF: Robert G. Hanvey, Curriculum Research Director; Edwin S. Dethlefsen, Unit Director--Study of Early Man; Patty Jo Watson, Unit Director--Great Transformation; Kurt W. Johnson, Assistant Director

E. PROJECT SUPPORT:
- a. Organizational sponsorship: American Anthropological Association
- b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
- a. Principal originator: American Anthropological Association
- b. Date and place of initiation: March 1962, Chicago, Ill.
- c. Reason for initiation: Expressed interest in anthropology in high school

G. PRESENT COMMERCIAL AFFILIATIONS: The Macmillan Company

H. PURPOSES AND SPECIFIC OBJECTIVES: This is the only federally supported secondary anthropology program.

It is designed to bring the conventional social studies curriculum in line with modern social science by introducing some of the information on and processes of observation and analysis of human history and human behavior characteristic of anthropology.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Anthropology, Secondary

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. The Great Tree and the Longhouse
2. "The Study of Early Man" and Teaching Plan
3. "The Great Transformation" and Teaching Plan
4. "Studying Societies" and Teaching Plan
5. Unit Information Sheets: "Study of Early Man" and "Great Transformation"
6. "Raising the Standard of Learning in the Social Studies"
7. "Anthropology in the Schools"
8. Newsletter No. 5

K. MATERIALS AVAILABLE FREE: 5, 6, 7, 8 (from Project Headquarters)

L. MATERIALS PURCHASABLE: 1, 8 and 9 (below), The Macmillan Company, 866 Third Avenue, N.Y. 10022

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed

O. USE OF PROJECT MATERIALS:
- a. Number of teachers using materials: 72
- b. Some specific schools where course is being taught: Abington

High School, Abington, Pa.; St. Louis Park High School, St. Louis Park, Minn.; Du Bourg High School, St. Louis, Mo.; Harper High School, Chicago, Ill.

P. MATERIALS PRESENTLY BEING DEVELOPED:

9. Kiowa Years and Kiowa Profile
10. An Annotated Bibliography of Anthropological Materials for High School Use
11. Area Studies: Africa, Latin America, India, Middle East
12. "Human Diversity"
13. Slide Tape: "The ACSP Materials: Content and Pedagogy"

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Detailed teaching plan.

R. PROJECT EVALUATION:

a. Instruments used: Objective tests, multiple-choice.
b. Control groups: The aim of the test was a growth score.
c. Feedback process: Results of tests will be sent to the teachers.
d. Behavioral objectives identified: Behavioral objectives include: avoidance of thinking in stereotypes; ability to put social data in an expanding context; perceiving some general principles inherent in specific data.
e. Research evidence of objectives achieved: Research evidence about such objectives would have to come from student behavior subsequent to the unit. Informal teacher reports indicate some such behavior.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Final testing of "Great Transformation" and "Study of Early Man" units; initial testing of "Studying Societies"; enlarged plans for preparation of teachers; development of unit on human diversity.

T. PLANS FOR THE FUTURE: None described.

A. PROJECT TITLE: ARLINGTON COUNTY K-12 CURRICULUM DEVELOPMENT PROJECT

B. PROJECT DIRECTOR: Dr. Harold M. Wilson, Associate Superintendent for Instruction, 4751 North 25th St., Arlington, Va. 22207. Tel: 301-JA 2-7700.

C. PROJECT HEADQUARTERS:

a. Address: Same as B. Contact Project Director.

b. Facilities available for viewing: K-6 visitors are welcome anytime; arrangements can be made through office of Mrs. Gennette Nygard, Director of Elementary Programs. 7-12 visitors are welcome anytime; arrangements can be made through office of Harold L. Mack, Director of Secondary Programs. Of special interest are summer non-credit enrichment programs.

D. PRINCIPAL PROFESSIONAL STAFF: Louis Baker, Chairman, K-12 Science Curriculum Committee, Yorktown High School, 5201 North 28th St., Arlington, Va. 22207; Raymond A. O'Neill and Alexander B. Costea, Elementary Supervisors; Phoebe H. Knipling, Secondary Science Supervisor.

E. PROJECT SUPPORT: Arlington County Schools.

F. PROJECT HISTORY:

a. Principal originators: Joseph B. Johnson, Alexander B. Costea, and Phoebe H. Knipling.

b. Date and place of initiation: 1962, Arlington, Va.

c. Reason for initiation: To develop and implement an articulate K-12 science curriculum.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To relate science concepts with and to specific experiences; to provide extensive laboratory experiences by developing suitable activities and securing adequate equipment and supplies; method of presentation which would be effective in teaching the so-called "slow learner" at all grade levels; to provide a wide variety of enrichment programs which would extend beyond the classroom; to relate teacher preparation to all new phases of curriculum change; to develop a continuous in-service program for teachers which would result in a close working relationship between teachers of all grades; to provide funds and time for continuous revision of program (curriculum and materials).

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: K-6 Living Things; Earth and Universe; Matter and Energy; Through experiences with the materials and processes of science; 7-9 General Science, grade 8; Science I and II, grades 8 and 9 (for slow learners); Earth and Space Sciences, grade 9. Enrichment programs: Science in Everyday Life, grade 7; Knowing Your Environment, grade 7; The Scientist at Work, grade 8; The World We Live In, grade 9; Exploring the Universe, Fossils and Man, applications of Mathematics - grades 8-12; Science in Action, grades 10-12; Laboratory Oriented Biology; Field Entomology; Mammalogy; Advance Topics in Chemistry; Advance Topics in Physics; Engineering Concepts.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Laboratory Experiences for Junior High School Science (grade 8).
2. Earth and Space Science Laboratory Guide (grade 9).
3. Earth and Space Science Course Guide.
4. Laboratory Guide for Science I and II (grades 8 and 9).
5. Laboratory Guide for Physical Science (grades 10-12).

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: 1. Laboratory Experiences for Junior High School Science (gr. 8)-$3.00; 2. Earth and Space Science Laboratory Guide (gr. 9)-$3.50; Dr. Harold M. Wilson, Arlington County Schools, Arlington, Va.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Elementary, approximately 50 (10%); Secondary, approximately 60 (100%).

b. Some specific schools where course is being taught: In each of the 30 elementary schools, at least one teacher is testing materials. Materials are being used in all secondary schools.

P. MATERIALS PRESENTLY BEING DEVELOPED: 4. Under revision; 5. Under revision; 6. Earth and Universe K-6; 7. Outdoor Education Guide to be used in enrichment programs.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION:

Format of Training Program	Nature of Content	Places where offered
Monthly released time Inservice, Elementary and High School	Experiences with equipment & processes in handling	In school buildings
Afternoon & evening short seminars on specific subjects and topics taught by our own teachers	Discussion of new ideas & developments and actually working with materials	In local school buildings - Elem. & high school
Teaming of teachers from different grade levels to work in seminar enrichment programs	Joint Planning	Local
Summer institutes and workshops (locally developed)	Guided experiences with materials - kits, locally developed experiments	In local buildings & at local colleges
NDEA and State sponsored Science Workshops and institutes, summer & winter	General science & science-math subject matter	At state and out-of-state colleges and universities

R. PROJECT EVALUATION:

a. Instruments used: None available at present.

b. Control groups: Not as such.

c. Feedback process: Return of reaction sheets to each activity; submitting of activities to be substituted or added; careful consideration of all suggestions; incorporation of practical suggestions into revised curriculum.

d. Behavioral objectives identified: General, but not specific.

e. Research evidence of objectives achieved: We do not as yet have facilities for producing and analyzing data.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Continuation of evaluation and development of materials.

T. PLANS FOR THE FUTURE: Summary writing conference to be held each summer with testing and evaluation during the school year; expansion of Outdoor Education Program; develop a K-12 Planetarium curriculum.

A. PROJECT TITLE: BIOLOGICAL SCIENCES CURRICULUM STUDY (BSCS)

B. PROJECT DIRECTOR: Dr. William V. Mayer, Director, BSCS, Department of Biology, Wayne State University, Detroit, Mich. 48202, Tel. 313-833-1400, X7324

C. PROJECT HEADQUARTERS:

a. Address: Biological Sciences Curriculum Study, University of Colorado, P. O. Box 930, Boulder, Colo. 80302, Tel. 303-443-2211, X6453, Contact: Dr. William V. Mayer or Dr. Jack L. Carter, Associate Director

b. Facilities available for viewing: The materials produced; the information film, "The Story of BSCS"; BSCS Single Topic Films; BSCS Newsletters

D. PRINCIPAL PROFESSIONAL STAFF: William V. Mayer, Director; Jack L. Carter, Associate Director; George M. Clark, Assistant Dir. for Fiscal Affairs; Keith L. Bumsted, Business Manager; Glen E. Peterson, Consultant; Manert Kennedy, Consultant; Burt Kempers, Consultant; Jane Larson, Director, Art. Dept.; Jayne Bendetti, Admin. Assistant; Richard Boolootian, Consultant; Doreen White, Admin. Assistant

E. PROJECT SUPPORT:

a. Organizational sponsorships: AIBS, 1959-63, University of Colorado 1963--

b. Funding agencies: NSF, NSF/AID, Asia Foundation, Rockefeller Foundation

F. PROJECT HISTORY:

a. Principal originator: American Institute of Biological Sciences (AIBS)

b. Date and place of initiation: 1959, Boulder, Colo.

c. Reason for initiation: To contribute to the improvement of biological education through the preparation of curriculum materials related to the study of biology.

G. PRESENT COMMERCIAL AFFILIATIONS: Publishers of our materials

H. PURPOSES AND SPECIFIC OBJECTIVES: To contribute to the improvement of biological education through preparation of curriculum materials related to the study of biology. Three versions of BSCS biology have been produced and are now being revised; an international program involves many scientists overseas in processes of adaptations of the three versions and other BSCS materials in various languages.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: First course in secondary school biology (10th grade) Ages 15,16; Second course in secondary school biology (12th grade) Ages 17,18; Supplementary materials for all secondary school levels in biology; Special materials for low-ability high school students; Materials for teachers of biology.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Blue Version - Biological Science: Molecules to Man: Houghton

Mifflin Company, 110 Tremont St., Boston, Mass. 02107

2. Green Version - High School Biology, BSCS Green Version: Rand McNally & Co., P. O. Box 7600, Chicago, Ill. 60680
3. Yellow Version - Biological Science: An Inquiry Into Life: Harcourt, Brace & World, Inc., 757 Third Avenue, New York, N.Y. 10017
4. Version Tests - Quarterly Achievement Tests in two alternate forms for each version are available through the version Publishers. Comprehensive Final Examination in two alternate forms and Processes of Science Test (POST): for all versions: The Psychological Corp., 304 E. 45th Street, N.Y., N.Y. 10017
5. Second Course - Biological Science: Interaction of Experiments and Ideas: Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632
6. Second Course Tests - Quarterly Tests and Final Examination: Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632
7. Special Materials - Biological Science: Patterns and Processes; Holt, Rinehart and Winston, Inc., 383 Madison Ave., N.Y., N.Y. 10017
8. Special Materials Tests - Unit Tests and Final Examination: The Psychological Corporation, 304 E. 45th St., N.Y., N.Y. 10017
9. Laboratory Blocks - Plant Growth and Development; Animal Growth and Development; Microbes: Their Growth, Nutrition and Interaction; The Complementarity of Structure and Function; Field Ecology; Regulation in Plants by Hormones--A Study in Experimental Design; Animal Behavior; Life in the Soil; Genetic Continuity: D.C. Heath & Co., 285 Columbus Ave., Boston, Mass. 02116. Innovations in Equipment and Techniques for the Biology Teaching Laboratory: D.C. Heath & Co., 285 Columbus Ave., Boston, Mass. 02116
10. Teachers' Handbook - Biology Teachers' Handbook: John Wiley & Sons, Inc., 605 Third Ave., N.Y., N.Y. 10016
11. Biological Investigations for Secondary School Students - Research Problems in Biology: Investigations for Students, Series One, Two, Three, and Four: Doubleday & Co., 277 Park Ave., N.Y., N.Y. 10017
12. Pamphlet Series (24 titles): D.C. Heath & Co., 285 Columbus Ave., Boston, Mass. 02116
13. Techniques Films (16 mm sound or 8 mm loop, silent): Thorne Films, 1229 University Ave., Boulder, Colo. 80302
14. BSCS NEWSLETTER
15. BSCS Special Publication No. 3, BSCS Materials for Preparation of In-Service Teachers of Biology.
16. BSCS Special Publication No. 4, The Teacher and BSCS Special Materials.
17. BSCS Special Publication No. 5, Laboratory Blocks in Teaching Biology
18. BSCS Bulletin No. 1: Biological Education in American Secondary Schools 1890-1960, by Paul DeH. Hurd, 1961
19. BSCS Bulletin No. 2: Teaching High School Biology: A Guide to Working with Potential Biologists, by Paul Brandwein, Jerome Metzner, Evelyn Morholt, Anne Roe, and Walter Rosen, 1963
20. BSCS Bulletin No. 3: BSCS Biology - Implementation in the Schools, by Arnold Grobman, Paul DeH. Hurd, Paul Lkinge, Margaret McKibben Lawler, and Elra Palmer, 1964

21. Laboratory Blocks, experimental editions.
22. The Molecular Basis of Metabolism
23. Information Film, The Story of BSCS
24. Physiological Adaptation

K. MATERIALS AVAILABLE FREE: Numbers 14, 15, 16, 17 and 24

L. MATERIALS PURCHASABLE: Numbers 1 through 13. and numbers 18 through 23. Nos. 18. - $3.50; 19. - $2.00; 20. - $3.50; 22. - $1.25; 23.-$1.25. Other prices may be obtained from the publisher.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Spanish, Portuguese, Italian, French, Chinese, Japanese, Russian, Hebrew, Turkish, Thai

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: Estimated 20,000 to 30,000
b. Some specific schools where course is being taught: Baltimore, Houston, Denver, Detroit, Chicago, and Los Angeles School Systems, etc.

P. MATERIALS PRESENTLY BEING DEVELOPED:
25. Revision of Versions
26. New Pamphlet Series
27. Single Topic Films 1 through 20 being prepared for commercial release
28. Single Topic Films 21 through 40 under production
29. Development of a Teacher Preparation Film

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Intend to carry on with the Special Publication Series, the cooperative college school program for teachers (starting with Los Angeles teachers) and in different areas of the U.S. Special materials briefing sessions will be held in fifty 5-day Institutes in 1967. Teacher preparation film being developed. Work is proposed on the preparation of a biomethods course in cooperation with CUEBS.

R. PROJECT EVALUATION: A pattern has been established for the evaluation of all BSCS classroom materials. The general parameters of this evaluation are indicated in BSCS NEWSLETTER No. 19. These include broad scale evaluation with the following facets: trial use in many different kinds of schools; reviews by persons in biology, education and psychology; classroom visits to test schools by authors and BSCS staff consultants; feedback from individual experimental teachers and students; and from groups of experimental teachers who meet regularly for the purpose of providing feedback. In addition, specially developed tests are administered to experimental students, where practical, to control students.

BSCS classroom materials are issued in a preliminary experimental edition and a revised experimental edition before a final rewriting for general release. The revisions made for the revised experimental edition and commercial edition reflect the results of feedback from various facets of evaluation. BSCS Biology, Blue, Green and Yellow Versions were tested over a three-year period with some 1,000 teachers and 165,000 students prior to general release. Parallel evaluations have been done on the Special Materials and Second Course programs. Detailed evaluation reports are included periodically in BSCS NEWSLETTERS.

BSCS evaluation is a continuing activity so that after classroom materials are generally released, further descriptive data may be obtained for future revisions of the materials.

In the testing program, all students are given verbal and numerical ability tests. The SCAT and DAT have been used with different groups of students. For the version program, a control group was used for two years. For the other programs and for the current version program, a control group has not seemed practical. (Rationale here is included in BSCS NEWSLETTER reports.) Because BSCS materials are quite different in content, purpose and philosophy from conventional materials, existing examinations developed for conventional materials are not considered relevant. The BSCS has therefore, developed multiple choice examinations which, in the minds of the writers of the material and the BSCS Evaluation Committee, reflect many of the aims and objectives of the BSCS. These are the tests that have been used to describe student performance in the BSCS evaluation. During the experimental period, testing is carried out with an idea of improving the materials. After the materials are in commercial publication, testing is carried on: to improve the existing tests and norm them so that these tests may become part of the curriculum; to better describe the materials to potential users and other interested persons; and, to obtain further feedback with a view to eventual revision of the materials.

The BSCS evaluation program is an on-going activity, where the emphasis changes at different points of the development of the materials, and where testing is only one of several facets. The BSCS recognizes that thus far the evaluation in terms of test development is only a beginning, that there are many BSCS aims and objectives that have not yet been adequately measured by means of tests. It is our plan to develop further types of experimental testing materials to examine the extent to which other aims and objectives have been achieved.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: BSCS Special Materials, Biological Science: Patterns and Processes published by Holt, Rinehart & Winston in July. Twenty Single Topic Films tested and ready for distribution; 20 more in preparation. Special Publication #4, The Teacher & BSCS Special Materials published in May. All three Versions revised in series of writing conferences in summer of 1965, to be published in 1968. Test item booklets for all three Versions prepared at writing conferences in summer of 1966 to be published early in 1967 and distributed free to teachers using Versions. Special Materials and Second Course Tests revised and published in final edition. Cooperated in adaptation activities in over thirty countries; maintained Resident Specialist in Central America. Special Publication #5, Laboratory Blocks in Teaching Biology, prepared, to be published February 1, 1967.

Prepared a series of seven or eight more Pamphlets.

T. PLANS FOR THE FUTURE: Revision of the information film, "The Story of BSCS"; Production of a Teacher Preparation Film; Developed proposal for establishing guidelines for the development of a modern instructional program in the life sciences as a one-year course for intermediate grades (7th or 8th); Special Materials program a 50 briefing sessions for 1,500 teachers throughout the U.S.; Expand cooperative college-school program we now have in Los Angeles International cooperation involving UNESCO project in Africa and over 30 other countries.

A. PROJECT TITLE: BOSTON COLLEGE MATHEMATIC INSTITUTE (BCMI)

B. PROJECT DIRECTOR: Stanley J. Bezuszka, S.J., Boston College, Chestnut Hill, Mass. 02167 Tel: 617-332-3200

C. PROJECT HEADQUARTERS:
  a. Address: Same as B. Contact Project Director.
  b. Facilities available for viewing: Visitor is welcome to visit institute classes; inspect experimental drill machines for classrooms; discuss project activities with staff members.

D. PRINCIPAL PROFESSIONAL STAFF: Albert A. Bennett, Consultant; Mary E. Farrey and Margaret J. Kenney, Staff Assistants; Francis Torras, S.J., Consultant.

E. PROJECT SUPPORT:
  a. Organizational sponsorship: Boston College.
  b. Funding agency: National Science Foundation.

F. PROJECT HISTORY:
  a. Principal originator: Stanley J. Bezuszka, S.J.
  b. Date and place of initiation: June, 1957, Boston College, Chestnut Hill, Mass.
  c. Reason for initiation: To direct the education and re-education of teachers of mathematics in content, theory and terminology of contemporary mathematics.

G. PRESENT COMMERCIAL AFFILIATIONS: The director of the institute is currently a mathematics consultant and author for the publishing house, William H. Sadlier, Inc., New York.

H. PURPOSES AND SPECIFIC OBJECTIVES: The major objective of the institute program is to offer courses and prepare instructional materials for teachers of mathematics. A distinguishing characteristic of the philosophy of this program is the emphasis on the structural approach to mathematics in combination with stress on the historical aspects of the subject.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: The institute program encompasses grade 7 through college sophomore directly, and the elementary grades to a certain extent, through consultation services. Emphasis is currently on the preparation of a computer oriented mathematics text, correspondence courses for teachers and a calculus text for secondary school students.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
  1. Contemporary Progress in Mathematics, Parts 1 and 2.
  2. Contemporary Progress in Mathematics, Parts 1 and 2 - Teacher Manual.
  3. Contemporary Progress in Mathematics, Part 3.
  4. General Contemporary Mathematics.
  5. Sets, Operations and Patterns.
  6. Sets, Operations and Patterns - Teacher Manual.
  7. Heritage Builders in the Arts and Sciences.
  8. Cooperative Unit Study Program, Course 1 - Teacher Edition.
  9. Student Edition.
  10. Cooperative Unit Study Program, Course 2.

K. MATERIALS AVAILABLE FREE: 30-day Examination copies only of texts are available. Descriptive brochures of the institute project ar available free upon request.

L. MATERIALS PURCHASABLE: Nos. 1-10, from: Mathematics Institute, Boston College, Chestnut Hill, Mass. 02167:

1.	$2.50 + .25 (postage)	6.	$1.00 + .25
2.	1.25 + .25	7.	1.75 + .25
3.	1.25 + .25	8.	Teacher Ed., 4.50 + .50
4.	1.00 + .25	9.	Student Ed., 4.00 + .50
5.	3.25 + .25	10.	4.50 + .50

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: A rough estimate is that at least 100 teachers are now using some of our materials in one way or another.

b. Some specific schools where course is being taught: Watertown Public Schools, Watertown; Waltham Public Schools, Waltham; Lowell Public Schools, Lowell, Mass.; Eureka Public Schools, Eureka, and Monterey Public Schools, Monterey, Calif.

P. MATERIALS PRESENTLY BEING DEVELOPED:

11. *Computer Oriented Mathematics* (a text for the secondary school student and certain college freshmen).
12. *Calculus* (a text for the secondary school student and certain college freshmen).
13. *Cooperative Unit Study Program*, *Course IE* (a correspondence program for the elementary school teacher).
14. Grade 7, 8 mathematics textbooks for William H. Sadlier, Inc

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Teacher preparation will continue in the form of several types of institute programs which will be offered during the school year and the summer. The courses in the various institute programs lead to the non-research Master of Arts Degree in Mathematics. Emphasis will be placed on the correspondence programs for those teachers unable to attend institutes. School system in-service programs will be staffed by trained former members of on-campus institutes.

R. PROJECT EVALUATION: No formal evaluation is being undertaken at present.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Operation of a summer, in-service, academic year institute for secondary school teachers of mathematics; consultation services for an elementary mathematics text series covering grades 1-6; operation of a mathematics workshop for teachers of mathematics at the National University of Ireland, Dublin.

T. PLANS FOR THE FUTURE: The future plans for the project include the completion of the materials mentioned in item P.

A. PROJECT TITLE: CAMBRIDGE CONFERENCE ON SCHOOL MATHEMATICS (CCSM)

B. PROJECT DIRECTOR: Mr. Hugh P. Bradley, Educational Services Incorporated, 55 Chapel St., Newton, Mass. 02158 Tel: 617-969-7100

C. PROJECT HEADQUARTERS:
a. Address: Same as B. Contact Project Director.
b. Facilities available for viewing: Copies of materials, literature about the program.

D. PRINCIPAL PROFESSIONAL STAFF: A number of people, on a consulting basis, developing materials under the direction of a Steering Committee, including: William T. Martin, M.I.T.; Peter Hilton, Cornell University; Andrew Gleason, Harvard University; Earle Lomon, M.I.T.; George Springer, Indiana University.

E. PROJECT SUPPORT:
a. Organizational sponsorship: Educational Services Incorporated
b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
a. Principal originators: William T. Martin, M.I.T.; Gilbert Oakley, Jr., Educational Services Incorporated.
b. Date and place of initiation: Summer 1963, Cambridge, Mass.
c. Reason for initiation: To explore curriculum reform needs in mathematics with a view to a long range future.

G. PRESENT COMMERCIAL AFFILIATIONS: Houghton Mifflin, publisher of "Goals for School Mathematics."

H. PURPOSES AND SPECIFIC OBJECTIVES: The program grew out of a conference in 1963 which explored curriculum reform needs in mathematics. The report of the conference, "Goals for School Mathematics", outlined exploratory thinking on mathematics curriculum. While it was recognized that the CCSM is not primarily engaged in the preparation of materials for classroom use, it was felt that it was necessary to develop and try out some materials to demonstrate the feasibility of the Goals. Thus, a continuing part of the program has been work with a limited number of schools, developing and trying out units. Copies of the working papers, listed in question J, are available upon request.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics, elementary and secondary.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. A Proposed Syllabus for the Seventh Grade
2. Elementary Modern Mathematics from the Advanced Standpoint
3. Proposed Program for the Tenth Grade
4. Order Structure in Elementary Mathematics
5. A Problem
6. Units
7. Probability
8. Notes on Desirable Responses at End of Sixth Year
9. Stream of Ideas on Checks, Approximations, and Order of Magnitude Calculations

10. Complex Numbers Leading to Trigonometry
11. Use of Negative Digits in Arithmetic
12. Use of Shift Theorem in Differential Equations
13. Topology in Tenth Grade and After
14. SMSG and the "Gifted" Child
15. What High School Juniors and Seniors Don't Know
16. The Use of Units
17. Exploration
18. The Exponential Function
19. A Proposed Course in Ninth Grade Geometry
20. Multiplication of Negative Numbers
21. Kindergarten
22. Morse School--First Grade (Inequalities Unit)
23. Morse School--Second Grade (Multiplication)
24. Morse School--Third Grade (Chip Trading)
25. Morse School--Third and Sixth Grades (Graphs and Their Application)
26. Morse School--Third Grade (Vector Geometry)
27. Morse School--Sixth Grade (Elementary Number Theory)
28. Morse School--Slopes and Limits (Lessons and Commentary)
29. Report of Activities in Cambridge during July and August 1964 under CCSM
30. Experimental Teaching
31. Palo Alto--Second Grade (Geometry, Logic, and Matrices)
32. Stanford--Eighth Grade (Geometry through Symmetry)
33. Progress Reports on Estabrook Project by Earle Lomon, Covering March 1964 through June 1965
34. Demonstration of Mirror Cards to Estabrook Teachers; Informal Geometry for Young Children; Symmetry Motions for Elementary School (Parts I and II)
35. Elementary Number Theory (Hosmer School, Sixth Grade, 1964/65)
36. Report of SMSG/CCSM Conference in March, 1965
37. Collected Reports of CCSM Writing Conference, Summer, 1965
38. Inequalities and Real Numbers as a Basis for School Mathematics
39. Geometry Report
40. Averages, Areas and Volumes

K. MATERIALS AVAILABLE FREE: As listed in question J. Available on request to: Cambridge Conference on School Mathematics, Educational Services Incorporated, 55 Chapel St., Newton, Mass. 02158

L. MATERIALS PURCHASABLE: "Goals for School Mathematics", available from Houghton Mifflin Company, 2 Park St., Boston, Mass., for $1.00.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: No records kept. Well

over 200 requests for materials have been received and filled.
b. Some specific schools where course is being taught: Estabrook School, Lexington, Underwood School, Newton, and Brookline Public Schools, Brookline, Mass.

P. **MATERIALS PRESENTLY BEING DEVELOPED:** "Goals for Mathematical Education of Elementary School Teachers" to be published by Houghton Mifflin in the spring of 1967. Various additional working papers, in the format of those listed in question J, available as in question K as they are completed.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Wellesley and Lexington, Massachusetts, have undertaken in-service training programs to prepare local teachers to teach the new materials. A small pilot experiment on in-service teacher training being conducted in Lexington and Newton, Massachusetts. It is hoped that a close teacher/sponsor relationship will give much information about learning processes and that classroom observation will provide information about the teaching difficulties arising from the use of advanced mathematics material by teachers of limited mathematics ability.

R. **PROJECT EVALUATION:**
a. Instruments used: Reports of teachers and consultants using and developing materials.
b. Control groups: None
c. Feedback process: None described
d. Behavioral objectives identified: The ability of young children to learn and understand modern mathematical concepts which in the past have been considered too advanced for them.
e. Research evidence of objectives achieved: Personal contact with pupils in the classrooms.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Conference held June/July 1966 to examine the problem of teacher education in mathematics and make recommendations for its solution (Cambridge Conference on Teacher Training). A report will be published as listed in question P. Pilot program on in-service teacher training. Additional working papers.

T. **PLANS FOR THE FUTURE:** The CCSM proposes to encourage the mathematicians who attended the Cambridge Conference on Teacher Training to continue their interest in the mathematical education of elementary school teachers.

Support is proposed for small seminar meetings at which eminent scholars in mathematics and the sciences will discuss the possibility of correlation in subject matter at school and at teacher college levels and of collaboration and correlation in all aspects of teacher education.

Classroom materials based on suggestions in the Goals will continue to be developed.

A. PROJECT TITLE: CHEMICAL BOND APPROACH PROJECT (CBA)*

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: L.E. Strong; H.A. Neidig; L.B. Clapp; M.K. Wilson; A.H. Livermore. 1959

C. PROJECT DIRECTOR: Laurence E. Strong

D. PROJECT HEADQUARTERS ADDRESS: Earlham College, Richmond, Ind. 4737

E. PROFESSIONAL STAFF: None

F. PROJECT SUPPORT:
   a. Organizational sponsorship: None listed
   b. Funding agency: National Science Foundation

G. SPECIFIC PURPOSES AND OBJECTIVES: Design of introductory course in chemistry. Course includes classroom text and laboratory experiments. Presentation of chemistry as a process of investigation with imaginative ideas used to interpret laboratory findings. Several novel ways of presenting certain topics in chemistry have been developed.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Chemistry, 11th and 12th grades and first year of college.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:
   From McGraw-Hill
   1. Text, Chemical Systems
   2. Students' laboratory guide, Investigating Chemical Systems
   3. Teachers' Guide to Chemical Systems
   4. Teachers' Guide to Investigating Chemical Systems
   5. Set of examinations
   From Earlham College
   6. Supplementary Readings from Journal of Chemical Education
   7. Electrostatics and Potential Energy - self-instruction programs (bound edition)
   8. Self-instruction Program on Charge Cloud Model - Part I
   9. Self-instruction Program on Charge Cloud Model - Part II
   10. Chart of electronegativities - atomic and ionic radii

J. USE OF PROJECT MATERIALS: Specific schools where materials are used: Marple-Newtown High School, Newtown Square, Pa.; Roxbury Latin School, W. Roxbury, Mass.; Warren High School, Downey, Calif

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Japanese (Iwanami Shoten); Portuguese (IBECC-UNESCO, Sao Paulo, Brazil); Spanish (Editorial Reverte)

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: None

N. MATERIALS AVAILABLE FREE: Newsletters - contact McGraw-Hill Book Company, Webster Division - publisher of the Newsletter.

O. MATERIALS PURCHASABLE: From McGraw Hill: 1. $6.96*; 2. 2.12*; 3. 5.00; 4. 5.00; 5. Contact McGraw-Hill for prices. *List price. Educational discount applicable. From Earlham College: 6. $2.00; 7. 1.00*; 8. $0.40; 9. $0.40; 10. 2.00. *List price. Quantity discounts available.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Project Evaluation was reported in: A.H. Livermore & F. L. Ferris, "The Chemical Bond Approach Course in the Classroom", Science, Dec. 7, 1962, Vol.138, No. 3545, pp. 1077-80; R. W. Heath and D.W. Stickell, "CHEM & CBA Effects on Achievement in Chemistry, " The Science Teacher, Vol.30, No. 5, Sept. 1963.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Summer Institutes

R. PROJECT ACTIVITIES SINCE 1965 REPORT: Publication of Electrostatics and Electric Potential Energy, Earlham College Press, Richmond, Ind.

S. PLANS FOR THE FUTURE: None, project is considered complete

*Response made for the 1966 Report.

A. PROJECT TITLE: CHEMICAL EDUCATION MATERIAL STUDY (CHEM STUDY)

B. PROJECT DIRECTOR: George C. Pimentel, Professor of Chemistry, University of California, Berkeley, Calif. 94720, Tel. 415-845-6000, X3835

C. PROJECT HEADQUARTERS:

a. Address: Lawrence Hall of Science, Wing B, Gayley Road, University of California, Berkeley, California 94720, Tel. 415-845-6000, X 3835, Contact: David W. Ridgway, Executive Director; Nora E. Grigsby, Administrative Assistant

b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: David W. Ridgway, Executive Director; Nora E. Grigsby, Administrative Assistant

E. PROJECT SUPPORT:

a. Organizational sponsorships: University of California and (until 1963) Harvey Mudd College, Claremont, Calif.

b. Funding agency: National Science Foundation

F. PROJECT HISTORY:

a. Principal originators: Glenn T. Seaborg, Chairman of the Steering Committee; J. Arthur Campbell, Director; George C. Pimentel, Editor of the text.

b. Date and place of initiation: January 9, 1960, University of California, Berkeley

c. Reason for initiation: CHEM Study is an outgrowth of a study committee set up in 1959 by the American Chemical Society under the chairmanship of Professor A. B. Garrett of Ohio State University to examine the purposes and content of high school chemistry courses with the view to the introduction of a drastically improved course.

G. PRESENT COMMERCIAL AFFILIATIONS: W. H. Freeman and Company, San Francisco, supplies printed materials; Modern Learning Aids, New York City, distributes the films

H. PURPOSES AND SPECIFIC OBJECTIVES: To diminish the separation between scientists and teachers in the understanding of science; to stimulate and prepare those high school students whose purpose is to continue the study of chemistry in college as a profession; to further in those students who will not continue the study of chemistry after high school an understanding of the importance of science in current and future human activities; to encourage teachers to undertake further study of chemistry courses that are geared to keep pace with advancing scientific frontiers, and thereby improve their teaching methods; to guarantee the existence in the near future of a variety of excellent high school chemistry texts significantly influenced by CHEM Study but produced under a normal author-publisher relationship; to reduce the likelihood that textbooks of the future will, by their failure to keep pace with the accelerating movement of science, make repeated curriculum studies necessary.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Senior High School Chemistry.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. CHEMISTRY--AN EXPERIMENTAL SCIENCE (textbook, 466 pages, clothbound)
2. CHEMISTRY--AN EXPERIMENTAL SCIENCE (laboratory manual, 138 pages, paperbound)
3. CHEMISTRY--AN EXPERIMENTAL SCIENCE (teacher's guide, 785 pages, paperbound)
4. Programmed instruction pamphlets: SLIDERULE (64 pages); EXPONENTIAL NOTATION (31 pages)
5. Achievement tests (set of 7 open-book, multiple choice tests, including 5 tests each covering 3 or 4 chapters, a semester final, and a year final); 2 series, designated 1963-64 and 1964-65.
6. Motion pictures:
    a. 26 films integrated into the course
    b. 2 teacher training films
    c. A film to acquaint laymen with the course: A CHANCE TO WONDER WHY--14 minutes
    d. A film to acquaint educators with the course: CHEM STUDY: INFORMATION FOR EDUCATORS--19 minutes
7. A series of 17 half-hour teacher training films which may be used on TV or for screening.
8. Teacher's Guide to the CHEM Study Films (102 pages paperbound)
9. CHEM Study Newsletter (issued as needed)

K. MATERIALS AVAILABLE FREE: CHEM Study Newsletter, University of California, Wing B, Gayley Road, Berkeley, Calif. 94720

L. MATERIALS PURCHASABLE: Items 1-5 above, available from W. H. Freeman and Co., 660 Market Street, San Francisco, Calif. 94104 (list prices F.O.B. shipping point, subject to normal educational discount) 1. $5.80; 2. $1.60; 3. $7.00 (free to teachers using textbook in quantity); 4. $0.50/set; 5. $1.00/set; 6-7. Films available from Modern Learning Aids, 1212 Avenue of the Americas, New York, N.Y. 10036; 8. $2.00 (free with purchase or rental of three or more films) from Modern Learning Aids

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Chinese, French, Gujerati, Japanese, Spanish, Hebrew, Portuguese, Hindi, Korean, Thai

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 6,900

b. Some specific schools where course is being taught: Available on request for any State.

P. MATERIALS PRESENTLY BEING DEVELOPED: Additional translations of written materials and films. Development of cartridge loops in cooperation with the Advisory Council for College Chemistry.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The National Science Foundation provides grants to summer institutes for science teachers. Some of these are specifically for CHEM Study teachers. A brochure listing these institutes may be obtained from the National

Science Foundation, Washington, D.C. 20550. Teacher training films as itemized under "J" are available from Modern Learning Aids. A list of consultants trained in the use of CHEM Study materials may be obtained from the CHEM Study office.

R. PROJECT EVALUATION:

a. Instruments used: Trial editions of course materials were tested over a three year period in a total of 550 schools with about 60,000 students.

b. Control groups: None at the present time.

c. Feedback process: An important feedback has been the sale of approximately 500,000 copies of the text and laboratory manual. Questionnaires have been received from twelve colleges concerning the achievement of some 7,500 chemistry students.

d. Behavioral objectives identified: Achievement of CHEM Study trained students versus conventionally trained chemistry students in introductory courses at college was studied. The completion record of CHEM Study trained students versus conventionally trained students was compared.

e. Research evidence of objectives achieved:

1. usage and adoption of the materials
2. achievement of students at the college level

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Agreements have been consumated with Prentice Hall, Houghton Mifflin and D.C. Heath and Company to do revisions of the CHEM Study materials. Two films, A CHANCE TO WONDER WHY and CHEM Study: INFORMATION FOR EDUCATORS have been completed.

T. PLANS FOR THE FUTURE: The CHEM Study Steering Committee will be continued. Liaison will be maintained with CHEM Study institutes and other CHEM Study activities. Information and advice on consultants will be provided. Activities related to translation, such as contracts and checking of translations for authenticity, will be continued. Supervision of contractors producing and distributing CHEM Study materials will be a continuing function.

A. PROJECT TITLE: COMPUTER-BASED MATHEMATICS INSTRUCTION AT THE STANFORD COMPUTER-BASED LABORATORY FOR LEARNING AND TEACHING

B. PROJECT DIRECTOR: Patrick Suppes, Institute for Mathematical Studies in the Social Sciences, Ventura Hall, Stanford University, Stanford, Calif. 94305. Tel: 415-DA 1-2300, X2970.

C. PROJECT HEADQUARTERS:
a. Address: Same as B. Contact Project Director.
b. Facilities available for viewing: Arrangements may be made for visiting the Laboratory and observing its operation.

D. PRINCIPAL PROFESSIONAL STAFF: Max Jerman, Director of Curriculum Operations; Luanna Berkowitz, Research Associate; Dow Brian, Systems Manager.

E. PROJECT SUPPORT:
a. Organizational sponsorship: Stanford University.
b. Funding agencies: Carnegie Corporation of New York, National Science Foundation; and United States Office of Education.

F. PROJECT HISTORY:
a. Principal originators: Patrick Suppes, Richard C. Atkinson, and William K. Estes.
b. Date and place of initiation: Summer, 1963. Stanford University.
c. Reason for initiation: To provide a controlled environment for psychological and pedagogical studies of learning.

G. PRESENT COMMERCIAL AFFILIATIONS: No direct commercial affiliations. Equipment being used has been purchased or leased from IBM, Philco, Westinghouse, and Digital Equipment Corporation.

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop an operational drill-and-practice program in elementary school mathematics, grades 1-6; to develop remedial work in basic mathematics for secondary school students at the drill-and-practice level; to develop a tutorial program in mathematical logic and algebra, and to develop a drill-and-practice program in spelling. The objective of both laboratories is then to test and evaluate these programs in as quantitative and in as scientific a way as is possible with methods of quantitative data analysis and behavioral and psychological theory.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Elementary mathematics, grades 1, 2, and 4; Mathematical logic; arithmetic drill-and-practice, grades 1-6.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Programmed instruction for above subjects.
2. The psychological foundations in mathematics.
3. Arithmetic drills and review on a computer-based teletype.
4. Some counting models for first-grade performance data on simple addition facts.
5. Computer-assisted instruction in initial reading: Stanford Project.

6. Linear structural models for response and latency performance in arithmetic.

K. MATERIALS AVAILABLE FREE: Technical Reports, Institute of Mathematical Studies in the Social Sciences.

L. MATERIALS PURCHASABLE: None described.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None described.

O. USE OF PROJECT MATERIALS: Brentwood School, Clark Avenue, East Palo Alto, California.

P. MATERIALS PRESENTLY BEING DEVELOPED:

7. Further work on mathematics curriculum for grades 1, 2, 4 - revision of logic and drill materials.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: One- to two-day teacher training program at the beginning of the academic year.

R. PROJECT EVALUATION:

a. Instruments used: Standard Achievement Tests.

b. Control groups: Yes. Control groups are matched classes in neighboring schools.

c. Feedback process: None described.

d. Behavioral objectives identified: Most important part of first analysis is analysis of mean rate of responding in terms of rate of learning and mean rate of errors. The second step is to identify structural variables in the curriculum materials that are the source of the main learning difficulties. Multi-linear regression analysis is being used for this purpose.

e. Research evidence of objectives achieved: Several technical reports from the Institute, particularly Technical Report 100, Linear Structural models for response and latency performance in arithmetic.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: There was continued work on mathematical logic in Stanford Computer-based Laboratory for Learning and Teaching, in addition Grant School in the Cupertino Union School District and Walter Hays School in the Palo Alto Unified School District have drill-and-practice programs in arithmetic for third through sixth grades. A first and second grade arithmetic drill-and-practice program is being carried on at Oak Knoll School in the Menlo Park City School District. At Clifford School in the Redwood City School District there is also an arithmetic program and at Ravenswood High School in the Sequoia Union High School District there is a language arts study in spelling fundamentals for fifth and sixth graders.

T. PLANS FOR THE FUTURE: Continuation on the same general program for the academic year 1967-68. It is planned to include a university-level course in elementary Russian.

A. PROJECT TITLE: CONCEPTUAL SCHEMES IN SCIENCE: A BASIS FOR CURRICULUM DEVELOPMENT

B. PROJECT DIRECTOR: Dr. Charles R. Botticelli, Associate Professor of Biology, Boston University, 2 Cummington Street, Boston, Mass. 02215, Tel. 617-262-4300

C. PROJECT HEADQUARTERS:
a. Address: National Science Teachers Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036, Tel. 202-223-9400, X521
For Project information, contact the Director in Item B.
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Ted F. Andrews, Director of Science, Educational Research Council of Greater Cleveland; Paul F. Poehler, Jr., Asst. Supt. of Schools, Lexington (Mass.) Public Schools; Chalmer J. Roy, Dean, College of Science and Humanities, Iowa State University; James A. Rutledge, Professor of Secondary Education, The University of Nebraska; Lawrence E. Strong, Chairman, Chemistry Department, Earlham College; Richard M. Whitney, Science Teacher, Roxbury Latin School, West Roxbury, Mass.

E. PROJECT SUPPORT: U. S. Office of Education

F. PROJECT HISTORY:
a. Principal originator: National Science Teachers Association
b. Date and place of initiation: June 1, 1966, Washington, D.C.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES:
1. To provide a more detailed interpretation of the conceptual schemes of science and the major items in the process of science, which are outlined in the NSTA publication, Theory Into Action in Science Curriculum Development, through analysis and expansion of the statements, together with any revisions that may appear to be desirable.
2. To prepare some examples of ways in which pupil activities, devised or re-oriented, may be treated so as to make maximum contribution to a better understanding of the conceptual schemes and greater facility in the process of science, and to assist teachers in designing curriculum materials and showing ways in which they can be used in the classroom.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Science, Kindergarten through 12th Grade

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: None

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: None, as yet.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No plans for other than English

O. USE OF PROJECT MATERIALS: None, as yet.

P. MATERIALS PRESENTLY BEING DEVELOPED: Expanded statements of conceptual schemes, outlined in the NSTA publication, Theory Into Action in Science Curriculum Development.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None

R. PROJECT EVALUATION: None described

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported

T. PLANS FOR THE FUTURE: None described

A. PROJECT TITLE: CONCEPTUALLY ORIENTED PROGRAM IN ELEMENTARY SCIENCE (COPES)

B. PROJECT DIRECTOR: Prof. Morris H. Shamos, COPES Project, New York University, 4 Washington Place, New York, N.Y. 10003, Tel. 212-SP 7-2000

C. PROJECT HEADQUARTERS:
a. Address: Same as "B".
b. Facilities available for viewing: Staff offices and work rooms

D. PRINCIPAL PROFESSIONAL STAFF: Morris H. Shamos, Director; J. Darrell Barnard, Associate Director; Janice A. Cutler, Research Scientist; Katherine E. Hill, Elementary Science Specialist; Vincent S. Darnowski, Research Associate; Bobby J. Woodruff, Research Associate; Rashid Shah, Research Assistant; Muriel Green, Elementary Science Teacher; Alvin Hertzberg, Elementary Science Teacher; Anne Saenger, Elementary Science Teacher

E. PROJECT SUPPORT:
a. Organizational sponsorship: New York University
b. Funding agency: Office of Education

F. PROJECT HISTORY:
a. Principal originators: Morris H. Shamos; J. Darrell Barnard
b. Date and place of initiation: September 1, 1965; New York University
c. Reason for initiation: To test the feasibility of a conceptual schemes approach to elementary science curriculum

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The ultimate goal, of which the current pilot project is a component part, is to develop an understanding of the nature of matter at various levels of sophistication.

Each concept, each conceptual scheme in this approach will be presented in a structured learning sequence with the purpose of contributing to this understanding. We plan to use the "spiral" system in which, at each succeeding level of sophistication and at an increasingly rapid pace, the students will begin from the most basic skills and concepts and will follow the entire learning sequence as far as their maturity and learning capacity will allow them to go in the understanding of the major conceptual schemes or of those subconcepts necessary to this understanding.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: We propose to use this approach with children from the time of their entrance into school. Presently, the production of a science curriculum from grades K to 6 would appear to be the first task, since the K-6 level represents the beginning of formal education and generally forms a single administrative unit.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. First draft of teachers' manual for teaching the conservation of energy conceptual scheme.

2. Tests for understanding of key terms and concepts have been prepared for use in the pilot study.

K. MATERIALS AVAILABLE FREE: None presently

L. MATERIALS PURCHASABLE: None presently

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English language

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No plans presently

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Sixteen teachers will be involved during the testing period for pilot study materials.

b. Some specific schools where course is being taught: Pilot materials will be tested in two elementary schools in Great Neck during February, March and April, 1967.

P. MATERIALS PRESENTLY BEING DEVELOPED: Final draft of materials mentioned in J above will not be completed until August 1967.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: We have given only general consideration to this problem so far.

R. PROJECT EVALUATION:

a. Instruments used: Test of understanding of key terms in the conservation of energy sequence; test of understanding of concepts in the conservation of energy sequence.

b. Control groups: Yes

c. Feedback process: Feedback will be obtained from the two teachers who will teach the materials in the pilot test and other teachers who will observe the classes during the time they are being taught the COPES materials. We will also get feedback from the test results.

d. Behavioral objectives identified: Yes

e. Research evidence of objectives achieved: None, as yet. However, we hope to have evidence after the pilot materials have been tested in two elementary schools.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Teaching materials, kits and tests have been prepared for the one conceptual scheme investigated in the pilot study.

T. PLANS FOR THE FUTURE: We are submitting a proposal to the Office of Education for funding of the major project. We hope to get started on it during September, 1967.

A. PROJECT TITLE: "CONSERVATION CURRICULUM IMPROVEMENT PROJECT" (CCIP)

B. PROJECT COORDINATOR: Albert H. H. Dorsey, Room 9, School of Education, University of South Carolina, Columbia, S. C. 29201
Tel: 803-254-2231

C. PROJECT HEADQUARTERS:
a. Address: Same as B.
b. Facilities available for viewing: Small office space, but project materials are available here for viewing.

D. PRINCIPAL PROFESSIONAL STAFF: Executive Committee: Jesse T. Anderson, State Supt. of Education; J. Carlisle Holler, Director of Division of Instruction; John Otts, Dean, School of Education, University of S. C.; Albert H. H. Dorsey, Coordinator, State Science Supervisor. Subject Consultants: Natural Resource Agencies, Colleges and Universities, State Dept. of Education. 34 Classroom Teachers: Various subject area levels and grade levels. Guidance Consultants: Paul F. Brandwein, Matthew J. Brennan.

E. PROJECT SUPPORT:
a. Organizational sponsorships: South Carolina Advisory Council for Conservation Education; Natural Resource Agencies; University of S. C.; State Dept. of Education; Civic Clubs; Garden Clubs.
b. Funding agency: The Belle W. Baruch Foundation, 274 Madison Ave., New York, N. Y. 10017

F. PROJECT HISTORY:
a. Principal originators: South Carolina Advisory Council for Conservation Education; Albert H. H. Dorsey; Matthew J. Brennan; Paul F. Brandwein.
b. Date and place of initiation: July, 1963, Columbia, S. D.
c. Reason for initiation: Lack of suitable conservation curriculum material; known need for conservation concepts to be integrated into lesson materials for various subject areas.

G. PRESENT COMMERCIAL AFFILIATIONS: None. Administered by the South Carolina State Department of Education in cooperation with the School of Education, University of South Carolina and the South Carolina Advisory Council for Conservation Education.

H. PURPOSES AND SPECIFIC OBJECTIVES: Development of "teacher guides" for conservation education.

To develop an instrument capable of providing guidance for teachers in the development of a desirable program of conservation education as an integral part of the total program; to provide background knowledge in conservation and an understanding of the principles of teaching conservation, in an effort to allay the feeling of insecurity which is presently experienced by many teachers; to provide resource information in the form of conservation concepts, activities, and their interrelationship with other disciplines; to develop an action program which will unite the public schools, natural resource agencies, and other interested groups in a combined effort to establish better conservation practices in our state.

It is unique in that it is an attempt to include implications for and concepts of conservation as an integral part of subject material units and not as a separate resource.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: "A View of the Environment" - Grades 1-3 (General); Grades 4-6 (General); Grades 7-9 (Science); Grades 7-9 (Social Studies); Grades 10-12 (Social Studies); Home Economics; Biology; Outdoor Classroom, Camping and Recreation.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: See I.

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: Will not be available until revisions are completed, based upon feedback from teachers participating in experimental use.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: Approximately 2,000.
   b. Some specific schools where material is being used: Approximately 50 districts in South Carolina.

P. MATERIALS PRESENTLY BEING DEVELOPED: Revision of experimental units in all levels listed in I.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Not complete enough to report.

R. PROJECT EVALUATION: None in effect at present.
   a. Instruments used: None yet.
   b. Control groups: Yes.
   c. Feedback process: Prepared questionnaire relative to each unit used for purpose of revision.
   d. Behavioral objectives identified: Not yet.
   e. Research evidence of objectives achieved: None yet.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Professional editing, printing, distribution, supervision for implementation, teacher-training and evaluation.

A. PROJECT TITLE: CURRICULUM DEVELOPMENT OF TEACHING GUIDES FOR SCIENCE (CHICAGO)

B. PROJECT DIRECTOR: Evelyn F. Carlson, Associate Superintendent, Department of Curriculum Development and Teaching, 228 North LaSalle St., Chicago, Ill. 60601 Tel: 312-332-7800.

C. PROJECT HEADQUARTERS:
a. Address: Board of Education, 228 North LaSalle St., Chicago, Ill. 60601 Tel: 312-332-7800. Contact Mrs. Evelyn F. Carlson.
b. Facilities available for viewing: Department of Curriculum Development and Teaching; Curriculum Planning and Guide Producing; Art layout area; Consultant headquarters.

D. PRINCIPAL PROFESSIONAL STAFF: James F. Redmond, General Superintendent of Schools; Evelyn F. Carlson, Associate Superintendent, Dept. of Curriculum Development and Teaching; Ellen L. Brachtl, District Superintendent in Curriculum; Mary C. Lacy, Director of Publications; Marjorie B. Molyneaux, Director of Science; Fred L. Betz, Fred A. Blackman, Lucille C. Daly, Hubert J. Freestrom, Bernard R. Osterberger, Elementary Consultants; Thomas A. Maloney-Science Fair Coordinator; Kathryn P. McHugh-Chemistry Consultant; Jens T. Midtaune-Physics Consultant; Kathleen Thom-Biology Consultant.

E. PROJECT SUPPORT: Chicago Board of Education.

F. PROJECT HISTORY:
a. Principal originators: Benjamin C. Willis; Evelyn F. Carlson; Ellen L. Brachtl, Chairman, Curriculum Council Science Committee.
b. Date and place of initiation: 1957, Chicago Board of Education.
c. Reason for initiation: To update and improve the science program.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: A coordinated, integrated, sequential science program for the elementary school presupposes certain basic objectives for each grade level which are reinforced and expanded at each succeeding grade level. These objectives are: the development of scientific concepts useful in understanding our natural environment; the development of skills of problem solving; and the development of the habit of scientific thinking.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: In the primary grades learning experiences are provided: (1) to develop an understanding of science concepts that will enable the child to describe natural occurrences, (2) to give the child practice in solving problems by different methods and to sensitize him to awareness that an orderly system is always involved, and (3) to develop the understanding that scientific thinking is based on observable facts.

In the intermediate grades learning experiences are provided: (1) to develop an understanding of science concepts that will enable the child to describe and to discover the cause and effect relationships in the natural occurrences persisting about him, (2) to give the child practice in planning and using previously learned facts and principles as tools in solving problems, and (3) to develop the understanding that in scientific thinking all related evidence is applied without prejudice.

In the upper grades learning experiences are provided: (1) to develop an understanding of science concepts that will enable the child to predict and evaluate the orderly occurrences persisting in nature, (2) to give practice in solving challenging problems which bring previously unrelated but known facts and principles into a new association, and (3) to develop the understanding that scientific thinking utilizes solutions to specified problems to generalize about natural forces, and to recognize the distinction between facts, principles, and laws.

In general science 9 learning experiences are provided for those pupils who did not gain sufficient science background in grades 7 and 8. The concepts in science 9 are identical with those of grades 7 and 8, but the learning experiences are different.

In the biology guide learning experiences are provided: (1) to develop an understanding of basic biological concepts at a broader, deeper, and more interrelated level than was offered in the elementary grades, (2) to give the student opportunity for supervised laboratory work in which laboratory techniques and skills are used in problem solving, and (3) to advance the quality of the student's scientific thinking through the development of attitudes and appreciations specific to biology, as evidenced in changed behavior.

The chemistry guide is designed to introduce the student to the facts, concepts, and theories of chemistry in a gradual and systematic manner; to develop manipulatory skills and techniques in the laboratory; and to acquire the resourcefulness, self-direction, open-mindedness, and respect for authority inherent in the development of scientific thinking.

The physics guide provides activities to enable the student to use the various systems of measurement, to work with matter in its basic states, to understand how the properties of matter depend upon the atomic structure, to know the relationship of matter and energy and their application to particles and wave motion.

Those students who through the results of tests or science teacher recommendation have been found to have developed an adequate background in science are placed directly into biology at the ninth grade level.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Curriculum Guides for Science Kindergarten - Primary One	$2.00
2. Independent Learning Activities Kindergarten - Primary One	2.00
3. Curriculum Guide for Science Primary Two - Three	2.50

4.	Curriculum Guide for Science 4-6	$3.50
5.	Curriculum Guide for Science 7-8	3.00
6.	Curriculum Guide for Science - General Science	3.00
7.	Curriculum Guide for Science - Biology	3.50
8.	Curriculum Guide for Science - Physical Science	*
9.	Curriculum Guide for Science - Chemistry	3.00
10.	Curriculum Guide for Science - Physics	3.50
11.	Curriculum Guide for Science - Advanced Biology	*
12.	Curriculum Guide for Science - Advanced Chemistry	2.00
13.	Curriculum Guide for Science - Advanced Physics	*
14.	Safety in the Science Laboratory	1.00
15.	"Quality Education", Science leaflet to parents	

*Field Test - not available for general distribution.

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: See J. Miss Mary C. Lacy, Director of Publications, Department of Curriculum Development and Teaching, Board of Education, 228 North LaSalle St., Chicago, Ill. 60601.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 22,000

b. Some specific schools where course is being taught: Chicago Public Schools.

P. MATERIALS PRESENTLY BEING DEVELOPED:

16. Independent Learning Activities Primary Two - Three.
17. Unit IV Advanced Biology Guide.
18. Laboratory Exercises to accompany Curriculum Guide for Science: Biology.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Science consultants discuss revised guides with representative teachers from every school in a district at meetings in each district; actual classroom use; visitations by science consultants.

R. PROJECT EVALUATION:

a. Instruments used: Individual questionnaires used in a four-year evaluation cycle.

b. Control groups: Not specifically identified.

c. Feedback process: Every teacher of science involved. Feedback instruments computerized; results analyzed by Research specialists. Reports supplied to Division of Science for use in Revision Cycle.

d. Behavioral objectives identified: Yes. Accumulating information for new evaluation cycle.

e. Research evidence of objectives achieved: Accumulating information for new evaluation cycle.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Distribution of new guides; introduction of guides to principals and teachers; in-service training of teachers toward: more intensive use of guides, and broader use of science equipment and materials.

T. PLANS FOR THE FUTURE: Continuation of four-year cycle of evaluation through use of science guides; evaluation of experimental programs in science being conducted in many of our schools.

Elementary:

- Elementary Curriculum Materials Project
- Elementary Science Study of E.S.I.
- Team Teaching
- Continuous Development

High School:

- Princeton Junior Science Program
- BSCS
- Chem. Study, CBA
- Introductory Physical Science Course
- PSSC
- Harvard Project Physics

Expansion of the Advanced Placement Program.

A. PROJECT TITLE: EARTH SCIENCE CURRICULUM PROJECT (ESCP)

B. PROJECT DIRECTOR: Ramon E. Bisque, P. O. Box 1559, Boulder, Colo., 80302, Tel. 303-443-2211, X7416

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above; Contact: Project Director
b. Facilities available for viewing: Films; Laboratory equipment; Visits to local schools using ESCP

D. PRINCIPAL PROFESSIONAL STAFF: Merrill K. Ridd, Associate Director; Ted Dutton, Director of Publications; Marjorie H. Gardner, Director, Teacher Preparation; Larry A. Irwin, Staff Assistant, Teacher Preparation; Edward C. Maruna, Staff Assistant, Teacher Preparation; William B. Nelson, Art Director: Robert E. Samples, Director, Laboratory Development Program, Coordinator, Film Program; John F. Thompson, Associate Director, Teacher Preparation

E. PROJECT SUPPORT:
a. Organizational sponsorship: American Geological Institute
b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
a. Principal originator: American Geological Institute
b. Date and place of initiation: May 1963; Boulder, Colo.
c. Reason for initiation: To improve secondary school science education.

G. PRESENT COMMERCIAL AFFILIATIONS: Houghton Mifflin Company; Encyclopaedia Britannica Educational Corporation; Prentice-Hall, Inc.; The Natural History Press

H. PURPOSES AND SPECIFIC OBJECTIVES: This program provides an interdisciplinary approach to earth science which weaves the various disciplines together to provide a comprehensive view of the planet earth and its environment. A series of investigations provide the student with experience to better understand the content. The main difference between this and earlier efforts is the interdisciplinary treatment and the investigative nature of the approach.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: All of the earth sciences--astronomy, geology, geography, meteorology, and oceanography--are served. The materials are developed for ninth-grade students in the 13 to 15 age bracket.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Investigating the Earth (textbook, laboratory manual, and teacher's guide)
2. Teacher Training Film, TOWARD INQUIRY
3. Newsletters Nos. 1-13
4. Reference Series pamphlets Nos. 1-6

K. MATERIALS AVAILABLE FREE: 3. Newsletter (published quarterly) from Project Headquarters

L. MATERIALS PURCHASABLE:
1. Investigating the Earth (commercial edition available from Houghton Mifflin Co., 110 Tremont Street, Boston, Mass. 02107)

4. Reference Series Nos. 1-6 (Educational Book Division, Prentice-Hall, Inc., Englewood Cliffs, N. J. 07632 -- $1 per set of 3)

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: French, Spanish, Japanese

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: 400
b. Some specific schools where course is being taught: List available

P. MATERIALS PRESENTLY BEING DEVELOPED: 5. Pamphlet Series (Field Study Guides and Single Topic Pamphlets) We are developing a number of additional Reference Series pamphlets and more subject matter films.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Teacher preparation efforts will be launched on any and all fronts where there is some hope of accomplishment. Teachers' needs may be generalized as: more content background in the subjects of earch science and thorough grounding in how to teach science as inquiry. NSF-funded in-service institutes, summer institutes, cooperative college-school programs, NDEA Title III workshops, local school district workshops, and meetings of this sort will be utilized. In addition, we are working with science education professors and subject matter departments at the college level to adjust their teaching toward the inquiry philosophy. A film was produced, TOWARD INQUIRY--Teaching Earth Science, which runs 21 minutes, black and white, 16mm, produced by EBEC. Workshop materials, projectuals, will also be produced. The use of video-tape is being tried as a potential tool in teacher preparation.

R. PROJECT EVALUATION:
a. Instruments used: Differential Aptitude Tests, Test of Science Knowledge and ESCP Comprehensive Final Test
b. Control groups: Yes
c. Feedback process: Written feedback was received from each teacher in the evaluation program each week of the school year. In addition, the test center contributed written feedback as well as specific subject matter experts who were paid to review the materials for content accuracy. ESCP staff members visited every test teacher at least twice during the school year, spending a half day watching and reacting to the teaching and learning situation and the effect the materials were having. All of this feedback was processed in the ESCP office and put in a form that could be used by the writers responsible for rewriting. The staff also analyzed the feedback and were guided by it in creating policy regarding revisions.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Staff activities during the past year have been primarily devoted to completing final revision for the commercial edition of Investigating the Earth; a combination text-laboratory manual for teaching science.

T. PLANS FOR THE FUTURE: Ancillary materials presently under development will be continued. These include Single Topic pamphlets, Field Study Guides, and a Reference Series. 16mm films are being produced and 8mm single concept loops are being explored. Teacher training will occupy the majority of the staff's time.

A. PROJECT TITLE: ELEMENTARY-SCHOOL SCIENCE PROJECT (ESSP)

B. PROJECT DIRECTORS: J. Myron Atkin, Professor of Science Education, University of Illinois, 805 West Pennsylvania Avenue, Urbana, Ill. 61801, Tel. 207-333-1846; Stanley P. Wyatt, Jr., Professor of Astronomy, 107a Observatory, University of Illinois, Urbana, Ill. 61801, Tel. 207-333-3090.

C. PROJECT HEADQUARTERS:
a. Address: Same as "B". Contact: Dr. J. Myron Atkin
b. Facilities available for viewing: There are no facilities or activities available for visitor viewing.

D. PRINCIPAL PROFESSIONAL STAFF: Science Staff: Henry Albers, Department of Astronomy, Vassar College; Karlis Kaufmanis, Department of Astronomy, University of Minnesota; Benjamin F. Peery, Department of Astronomy, University of Indiana; Science Education Specialists: Roy A. Gallant, The Natural History Press, New York, N.Y.; Alvin Hertzberg, Elementary Schools, Great Neck, N.Y.; Bernard E. Nurry, Rose Tree Media Schools, Media, Penn.; Helen W. Pierce, Editor, Falmouth Public Schools, Falmouth, Mass.; Robert A. von Neumann, Illustrator, Professor of Art, University of Illinois; Peter B. Shoresman, College of Education, University of Illinois; Fred R. Wilkin, Jr., Scott, Foresman and Company, Flenview, Ill.; JoAnn M. Stecher, Research Associate, University of Illinois

E. PROJECT SUPPORT:
a. Organizational sponsorship: University of Illinois
b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
a. Principal originator: University of Illinois
b. Date and place of initiation: September 1960, Urbana, Ill.
c. Reason for initiation: To revise the curriculum in astronomy in the elementary and junior high school grades in such a way as to bring it in line with the view of astronomy held by the astronomer authors.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop and write astronomy materials for the elementary and junior high schools that reflect the structure of the subject as it is viewed by professional astronomers.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Astronomy, grades 5 - 9

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. CHARTING THE UNIVERSE, Pupil's Book, 1966, deals chiefly with measurement of size and distance of astronomical objects so that a static snapshot model of the universe can be developed.
2. CHARTING THE UNIVERSE, Teacher's Guide, 1966
3. THE UNIVERSE IN MOTION, Pupil's Book, 1966, is concerned with how celestial bodies move in space and how these motions are observed by astronomers.
4. THE UNIVERSE IN MOTION, Teacher's Guide, 1966

5. GRAVITATION, Pupil's Book, 1966, investigates the causes of celestial motion and the laws that apply to all moving things in the universe.
6. GRAVITATION, Teacher's Guide, 1966
7. THE MESSAGE OF STARLIGHT, Pupil's Book, 1966, turns to the analysis of light as an essential clue to understanding astronomical phenomena.
8. THE MESSAGE OF STARLIGHT, Teacher's Guide, 1966
9. THE LIFE STORY OF A STAR, Pupil's Book, 1966, considers the interiors of stars, their energy sources, and their evolution.
10. THE LIFE STORY OF A STAR, Teacher's Guide, 1966
11. GALAXIES AND THE UNIVERSE, Pupil's Book, 1966, deals with the largest known units of matter astronomers have yet discovered--galaxies--and with the arrangement and motion of these units in the universe.
12. GALAXIES AND THE UNIVERSE, Teacher's Guide, 1966

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: All titles at $1.50 each.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGE INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: CHARTING THE UNIVERSE - Portuguese

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: In 1967, 50 teachers will be evaluating four of the books from classroom experiences.

b. Some specific schools where course is being taught: Locations of some of the trial centers are: River Forest, Ill.; Spokane, Wash.; Portland, Ore.; Sacramento County, Calif.; Elgin, Ill.; Walnut Creek, Calif.

P. MATERIALS PRESENTLY BEING DEVELOPED: Certain books are being revised.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A comprehensive teacher's guide is available for each book.

R. PROJECT EVALUATION:

a. Instruments used: A portion of the evaluation program for each book consists of three tests administered as pre-and post-tests. The evaluation instruments are: an achievement test developed specifically for each book; an interest inventory to assess the impact of ESSP material on the student's attitude toward science in general; a test to determine a student's appreciation for science and "sciencing".

b. Control groups: There were control groups for two of the books evaluated.

c. Feedback process: Reactions were solicited from cooperating teachers, both in writing and through interviews. Members of the Project staff observed in classes in the trial centers.

d. Behavioral objectives identified: None

e. Research evidence of objectives achieved: Our research is still incomplete. Detailed information on the results of our research will be available in August, 1967.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** A summer writing conference was conducted in 1966 during which time the six books in the series were revised.

T. **PLANS FOR THE FUTURE:** The Project has completed the astronomy series. Activities in the Project will concentrate upon broad evaluation questions related to this and other course content improvement projects.

A. PROJECT TITLE: ELEMENTARY SCHOOL SCIENCE PROJECT, UTAH STATE UNIVERSITY (ESSP-USU)

B. PROJECT DIRECTOR: Dr. John K. Wood, Physics Department, Utah State University, Logan, Utah 84321, Tel. 801-752-4100, X698 or 466

C. PROJECT HEADQUARTERS:
  a. Address: Same as B
  b. Facilities available for viewing: Class visitation where material is used if prearranged.

D. PRINCIPAL PROFESSIONAL STAFF: R. T. Sanders, Professor of Physiology

E. PROJECT SUPPORT:
  a. Organizational sponsorship: Utah State University
  b. Funding agency: NSF (until February 1, 1967)

F. PROJECT HISTORY:
  a. Principal originators: John K. Wood, A. L. Braswell
  b. Date and place of initiation: January 1962, Utah State University
  c. Reason for initiation: It was initiated to provide a more realistic science program for the elementary grades than those traditionally supplied.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The purpose of the project is to provide qualitative and quantitative experiments for children from 5 to 7 years, which can be understood in terms of their experience and which use the methods and techniques of science. These methods and techniques are adapted to the interests and abilities of the age group.

The emphasis is placed on the methods and techniques as ways of solving interesting puzzles and leads to the introduction of scientific concepts. The results are in the form of a Teacher's manual for First and Second Grades since the background of the teacher must be enhanced and the communication with the pupils must be through the teacher.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Kindergarten: Identification of pairs of similar objects and of differences in almost similar objects; First Grade: Puzzles, observation, classification and interactions as determined by sight, sound and touch. Animals and their environment; Second Grade: Review of puzzles, observation and classification, measuring, graphing, more interactions. Fresh and sea water environments.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
  1. Newsletter - published irregularly
  2. Science for First Grade - A Manual for Teachers
  3. Concept Prerequisite and Development Test Specimen Set
  4. Science for Second Grade - A Manual for Teachers

K. MATERIALS AVAILABLE FREE: 1. Newsletter, ESSP-USU, Logan, Utah, 84321

L. MATERIALS PURCHASABLE:

2.	Science for First Grade	$1.50
4.	Science for Second Grade	$1.50

USSP-USU, Logan, Utah 84321

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: 20
   b. Some specific schools where course is being taught: Hillcrest Elementary School; Riverside Elementary School; Wilson Elementary School; Woodruff Elementary School; Adams Elementary School; Ellis Elementary School

P. MATERIALS PRESENTLY BEING DEVELOPED:
   5. Kindergarten Lessons
   6. Third Grade Teachers Manual
   7. Fourth Grade Teachers Manual

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A Physical science text for Education majors (in preparation); Teacher training films; A specific training program has not been planned as yet.

R. PROJECT EVALUATION:
   a. Instruments used: Teacher comments
   b. Control groups: None
   c. Feedback process: None described
   d. Behavioral objectives identified: Yes. Has the ability of the pupil to solve a more complex logical puzzle changed as a result of the program? We have not set up a method for evaluating this.
   e. Research evidence of objectives achieved: None

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Summer conference of writers produced a Second Grade Manual and a Biological manual to be included with the First Grade Manual.

T. PLANS FOR THE FUTURE: Summer Conference (1967) to begin third and fourth grade manuals; Winter 1967-68--a trial of new lessons; Summer Conference 1968 to complete third and fourth grade manuals; Winter 1967-68--produce teacher training films.

A. PROJECT TITLE: ELEMENTARY SCIENCE ADVISORY AND RESEARCH PROJECT

B. PROJECT DIRECTOR: Prof. David Hawkins, Elementary Science Advisory Center, Ketchum 306W, University of Colorado, Boulder, Colo. 80302

C. PROJECT HEADQUARTERS:

a. Address: Same as B.

b. Facilities available for viewing: We maintain a laboratory for the development of science materials for use in elementary schools. Models of suggested apparatus are on view and many materials are available for experimenting with by elementary school teachers who are invited to visit and work in the laboratory.

D. PRINCIPAL PROFESSIONAL STAFF: David Hawkins, Director; Ronald Colton, Research Associate; Frances Hawkins, Consultant.

E. PROJECT SUPPORT: University of Colorado; U. S. Office of Education; Rocky Mountain Educational Laboratory; Educational Services, Inc.

F. PROJECT HISTORY:

a. Principal originator: David Hawkins

b. Date and place of initiation: September, 1965, University of Colorado.

c. Reason for initiation: Improvement and innovation in the style of teaching science and in science materials in elementary schools.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Our purpose is to explore new patterns for facilitating children's work in the elementary school science curriculum and of modifying the content and style of available science materials accordingly. An hypothesis underlying our work is that children's learning, in this area and others, will be enhanced if the single-sequence organization of work is modified to allow a multiplicity of individual choices on the part of children as to selection of materials to work with, development of goals or problems, and manner of work. Such a classroom organization inevitably brings about much greater diversity of classroom activity than currently prevails in other subject-matter areas or even in science. The teacher is thus displaced from the role of instructor to that of diagnostic observer and "laboratory assistant," spending a major portion of his time working with individuals or small groups. Having helped to evolve classrooms operating in this style, it is our further purpose to carry on observational research aimed at the description of children's learning behavior and strategy. During the year reported, our Center has assisted in the development of a local pilot program in elementary science and has attempted to assist teachers in introducing new science materials. Some of these materials have been introduced in order to enrich existing science units, some to explore the possibilities of more self-evolved investigation. During the year a number of short and one longer course have been conducted by the Center. The purpose of these courses has been to introduce teachers to elementary school science materials in general and to encourage their own work with science materials in a style comparable to that which we would hope for in the classroom.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** Science: grades 1 to 6, ages 6 to 12, and some work with pre-school children. It is hoped that our style of teaching science will be adapted to the teaching of other subjects as well, e.g. art, social studies, mathematics.

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:** We shall soon begin the publication of a series of guides for elementary school teachers. The first two will be:
1. Science Equipment in the Elementary School
2. no title as yet

K. **MATERIALS AVAILABLE FREE:** Our pamphlets will be distributed free of charge to elementary schools and educators in our region, and to Curriculum Groups elsewhere.

L. **MATERIALS PURCHASABLE:** The pamphlets will be available at a minimal cost from Publications Service, University of Colorado.

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** We have no plans for translation at present.

O. **USE OF PROJECT MATERIALS:**
a. Number of teachers using materials: 20
b. Some specific schools where course is being taught: Columbine Elementary School and Martin Park Elementary School, Boulder, Fairview Elementary School, Denver, Colo.

P. **MATERIALS PRESENTLY BEING DEVELOPED:**
3. Further guides for elementary school teachers on: patterns and colors; use of Native dyes; batteries and bulbs; use of school gardens; case histories of elementary school classes with whose teachers we have worked.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Our laboratory is open during the day and on some evenings for teachers and principals of local and nearby elementary schools, who have shown considerable interest in visiting us for discussion and to obtain advice. We conduct summer courses and short courses (two or three days) at any time on request for teachers, and honors courses for undergraduates at the University of Colorado.

R. **PROJECT EVALUATION:**
a. Instruments used: Observation and participation by our staff, preliminary to preparation of case-history material.
b. Control groups: None
c. Feedback process: See a, - also reports from teachers, with emphasis on modifications and extensions of our material.
d. Behavioral objectives identified: Yes

e. Research evidence of objectives achieved: From case study material and reports of teachers.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: To continue work in the above pattern, building a small permanent staff with visitors as funds allow; to arrange practical courses for teachers in service, and summer-school courses; to continue publication of pamphlets on special science topics and general methods, and to undertake observational research in classroom learning and teaching.

A. **PROJECT TITLE:** THE ELEMENTARY SCIENCE PROJECT *

B. **PRINCIPAL ORIGINATOR AND DATE OF PROJECT INITIATION:** Joseph C. Paige. March 1964.

C. **PROJECT DIRECTOR:** Joseph C. Paige.

D. **PROJECT HEADQUARTERS ADDRESS:** Departments of Education and Physics, Box 574, Howard University, Washington, D. C. 20001.

E. **PROFESSIONAL STAFF:** Halson V. Eagleson, Associate Director; Thelma Johnson, Associate Director; Edith Calhoun, Staff Consultant (Social Work); Wanda Mitchell, Secretary; Charles Wells, Project Coordinator; E. Robert Adkins, Evaluation; Program Development: Willis Hines, Christine Raye, Josh Mack, Shirley and Garland Kearney, Leroy Daniels, Robert Wells, Emily Herring, Ann Fuller, Randolph Scott; Consultants: Mildred O. Tucker, Andrew Robinson, Freddie Banks, Allonia Gadsden, Eudora Winters, Edyth Lyons.

F. **PROJECT SUPPORT:**

a. Organizational sponsorship: Howard University.

b. Funding agencies: U. S. Office of Education, National Aeronautics and Space Administration (Adult Literacy), Western Electri Fund, Burns and Roe, Inc., Morris Morgenstern Foundation, Royal Crown Cola Company, The Perkin-Elmer Corporation, and Mrs. Carroll Prentice Eveleigh.

G. **SPECIFIC PURPOSES AND OBJECTIVES:** (1) To develop a program of compensatory science experiences for disadvantaged children (K-6) and their parents; (2) To determine whether or not the participation in these experiences by disadvantaged children and their parents can help, in a significant way, to overcome social and personal handicaps which usually attend such privations; and (3) To discover what changes in behavior in both children and parents may result from participation in the project. In addition, The Elementary Science Project administers the National Adult Space Literacy Project under contract with the Educational Programs Division, National Aeronautics and Space Administration.

H. **SPECIFIC SUBJECTS AND GRADE LEVEL:** Kindergarten through sixth grade (K-6).

I. **MATERIALS ALREADY PRODUCED AND DESCRIPTION:** Fifty elementary science activity kits have been produced. As examples, seventeen of the fifty titles are:

1. Air has pressure
2. Air and water
3. Changing air pressure
4. Gravity flow system
5. Heat
6. How seeds become plants
7. Metals
8. Mirrors
9. Pressure
10. Static electricity
11. Space materials
12. Sound
13. Surface tension
14. Taste
15. The magnifying glass
16. The suction cup
17. Magnets

Articles about the project have appeared in the following publications:

18. Science Newsletter, Oct. 1964; 19. Ward's Newsletter, Nov. 1964; 20. Howard University Magazine, Jan. 1965; 21. Science and Children, March 1965; 22. The Elementary Science Project: A Progress Report, 1966.

J. USE OF PROJECT MATERIALS: Ten teachers are using complete program and fifty are using portions of it. Some specific schools using the materials: Katie C. Lewis School and the East River Homes Children's Center of Mills College of Education. Cooperating Centers have been established in North Carolina, Washington, D.C., and New York City. It is emphasized that the original material was developed for enrichment purposes for use after school and in Saturday sessions.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Possibly Korean (in discussion stage).

M. MATERIALS PRESENTLY BEING DEVELOPED: None. Performance objectives are being developed for new materials for adults.

N. MATERIALS AVAILABLE FREE: Items 18, 19, 20, 21, and 22, Section I above, available upon request.

O. MATERIALS PURCHASABLE: None. It is planned to make the kits and other materials available for sample distribution in Fall, 1966.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: Special checklists have been developed for evaluations by children and their parents, area coordinators, group leaders, and staff. Pre-tests were not used in the initial evaluation. This was because of the special nature of the materials developed. Procedures are being formulated for an extended evaluation in cooperation with some of the personnel of the Institute for Developmental Studies, New York Medical College, the Institute for Youth Studies at Howard University, and the Washington Institute for Research and Experimental Studies.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Plans are tentative.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: (1) Continued testing of experimental kits and materials in cooperating centers in North Carolina, Washington, D. C., New York City, Florida, and Louisiana; (2) Materials were also tested in several urban schools and with some 4-H groups; (3) Joint sponsorship of Saturday Science Participation Sessions with the District Commissioner's Youth Council; (4) Gave assistance to agencies and groups, nationally, in the formulation of action programs for disadvantaged persons; and (5) Developed, under contract with the National Aeronautics and Space Administration, the National Adult Space Literacy Project, as a pilot effort.

S. PLANS FOR THE FUTURE: Further plans, including Topics, are to be announced in a special newsletter.

*Response made for 1966 Report.

A. PROJECT TITLE: ELEMENTARY SCIENCE STUDY (ESS)

B. PROJECT DIRECTOR: Charles Walcott, 55 Chapel Street, Newton, Mass. 02160, Tel. 617-969-7100, X504

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above. Contact: Randolph Brown
b. Facilities available for viewing: In-house workshops are held periodically for school administrators, science supervisors, etc. Visits should be made by appointment only, through Mr. Brown's Office.

D. PRINCIPAL PROFESSIONAL STAFF: Charles N. Ascheim, Elizabeth Barnett Beth Barth, Winfield Benner, Patricia Brinson, Randolph Brown, Merle S. Bruno, P. Christiansen, Rose Christiansen, Edith H. E. Churchill, Rose L. Crowley, William H. Floyd, Donald E. Ford, Robert Gardner, Mary S. Gillmor, Christopher Hale, William P. Hull Ralph C. Jenkins, Mogens Kristensen, Allan Leitman, Paul S. Lorris John H. Merill, Martin C. Michener, Adeline Naiman, Frieda S. Ployer, Lynn Sagan, Mary Lela Sherburne, Malcolm H. Skolnick, Charles Walcott, Rosly M. Walter, Daniel H. Watt, David Webster, William H. Weston, Gerald F. Wheeler, Gunther Weil

E. PROJECT SUPPORT:
a. Organizational sponsorship: Educational Services Incorporated
b. Funding agencies: National Science Foundation. (We are sometimes asked by teacher training or research organizations or schools to work out a program of introduction of our materials, and we have accepted small grants for such short-term efforts, e.g., Peace Corps, Cardozo Model School District.)

F. PROJECT HISTORY:
a. Principal originator: Educational Services Incorporated
b. Date and place of initiation: 1960; Cambridge, Mass.
c. Reason for initiation: With the increasing importance of science and technology in today's society, there was a need to upgrade science and math in the secondary schools to better prepare them for college studies in these areas. A number of curriculum development groups undertook this task, and out of one of these--the Physical Science Study Committee--Educational Services Incorporated was organized. As the PSSC program progressed, it was decided to initiate a similar effort for the elementary schools.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Primarily we hope to develop more meaningful science materials for use by children. Our program is a highly individual experimental one in which all children have access to the materials for open-ended rather than teacher or textbook directed investigations. Careful attention is given to all materials used so that all equipment looks like materials which are normally accessible to children in their own environment and not imposingly "scientific". A mixture of university scientists and master teachers work together in our laboratories and in classrooms to test and revise their ideas before the materials are released for general use in the schools. ESS materials have been used equally successfully in middle-class suburban and low socio-economic areas, large cities and small towns, and in a great variety of different situations.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: See answers to "J" and "P".

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: (Commercial Editions)

1. Behavior of Mealworms (Grade 6) This unit stimulates children to ask questions about the observable behavior of an unfamiliar animal and then directs them to ways of finding answers for themselves. Equipment: mealworms, food, containers; Printed matter: teacher's guide, two student booklets (How Barn Owls Hunt and How A Moth Escapes from its Cocoon), set of pictures; Film: one 16mm, black and white, sound: How to Make a Mealworm Back Up (for teachers.

2. Gases and "Airs" (Grades 5-8) This is an introductory unit examining some properties of gases in a series of closely linked laboratory experiments in which children analyze the interaction of air with "things" in the environment. Equipment: tubes, candles, steel wool, seeds; Printed matter: teacher's guide, worksheets; Film: one 16mm, Black and white, sound: Gases and "Airs" in the Classroom (for teachers); Four 8mm loops, color: Candle Burning Techniques, Candle Burning I, Candle Burning II, The Mouse and The Candle.

3. Growing Seeds (Grades K-3) In this unit children plant a collection of seeds and non-seeds to see which ones grow. They dig up some of the seeds to find out what happens underground. Then each student plants a new corn seed and cuts a strip of paper daily showing the height of his plant. Children find that the collection of strips can tell a lot about the way their plants grew. Equipment: seeds, soil, containers; Printed matter: teacher's guide; Film: two 8mm loops, color: Bean Sprouts, Plant Growth-Graphing.

4. Kitchen Physics (Grades 5-7) This is a first course in science drawn from the child's environment. The student investigates the properties of common liquids--typically water, soapy water, oil, alcohol, and syrup. He considers a number of questions about the behavior of these liquids which directs his attention to such attributes as the way they are absorbed, evaporate, drop, stream, and interact with various surfaces. Equipment: drip tubes of varying diameters, liquids, balances, droppers, container; Printed matter: teacher's guide, worksheets; Film: three 8mm film loops, color: Beading of A Water Column, Water Rise in Blotter Strips of Graded Width, Water Rise in Blotter Strips Exposed and Enclosed.

5. Small Things - An Introduction to the Microscopic World (Grade 5) This unit introduces the child to the microscopic world, the instruments needed to make it accessible, and the differences in appearance and structure of non-living and living things. Equipment: microscopes, slides, stains, plants, crystals, pond cultures; Printed matter: teacher's guide, student booklet (The Faithful Eye of Robert Hooke), worksheets, sets of pictures; Film: one 16mm, color, sound: Paramecium, Euglena, and Amoeba (for

children); one 16mm, black and white, sound: A Small Things Classroom (for teachers); Eleven 8mm loops, color: Paramecium, Euglena, Amoeba, Budding of Yeast Cells, Blepharisma, Stentor, Rotifer, Vorticella, Volvox, Stylonychia, Comparative Sizes of Microscopic Animals. Commercial Editions Under Preparation

6. Microgardening (Grades 4-7) This unit helps children gain familiarity with the rapid growth and the remarkable diversity of molds. Children become familiar with and readily develop pure culture procedures adequate for carrying out experiments that lead to understanding the reasoning of the great pioneers in medicine, agriculture, microbiology, and food technology. They recapture some of the excitement of the individual achievement of workers in earlier times, a hundred years ago, and they gain appreciation of the importance of molds and other micro-organisms in the great cycles of growth and decay. Equipment: containers, nutrient media; Printed matter: teacher's guide, booklet (Illustrated Handbook of Some Common Molds); Film: seven 8mm loops, color: Alternaria, Rhizopus, Fusarium, Penicillium, Trichoderma Growth Rings, Rotting Pear, Mushroom Growth and Reaction.
7. Bones (Grades 4-6) This unit engages the students in activities with bones. They become familiar with a variety of bones, notice the similarities and differences among them, and experience the satisfaction (and frustration) of making skeletons. Equipment: disarticulated skeletons, assorted bones; Printed matter: teacher's guide, two student booklets (Bones Picture Book, How to Make a Chicken Skeleton); Film: five 8mm loops, black and white: X-Ray Motion Pictures Head and Neck, X-Ray Motion Pictures Shoulder, X-Ray Motion Pictures Knee and Elbow, X-Ray Motion Pictures Hand, X-Ray Motion Pictures Foot.
8. Mirror Cards (Grades 1-7) This unit uses mirrors and cards with carefully designed patterns on them to help children become acquainted simultaneously with some elementary geometric optics and the concepts of symmetry. Equipment: cards, mirrors; Printed matter: teacher's guide.
9. Curious Gerbils This is a handbook for children on the care of these small classroom animals. It also suggests some experimental questions on diet and behavior.
10. Light and Shadows (Grades K-3) This is a beginning unit in geometric optics. Children use many shapes and their own movements to examine shadows and light sources. Printed matter: teacher's guide
11. Attribute Games and Problems (Grades K-8) This unit is concerned with the development of thinking skills in children. The subject matter is logic, but the emphasis is on developing problem solving skills and attitudes which will be useful in a wide variety of situations. Children explore problems of classification and become skillful in dealing with the relationships between classes. These materials are designed for use from kindergarten through junior high school by small groups of children. Older children may work directly from a set of problem cards; the teacher will introduce the various games and problems to the younger children. Equipment: three kinds of blocks, loops; Printed matter: teacher's guide, problem cards.
12. Butterflies (Grades 1-4) This unit provides fertile butterfly eggs in the classroom. Students and teachers raise these animals

through larval and pupal stages until the adult butterflies emerge. These butterflies can then be mated, fertile eggs produced, and the cycle repeated. This unit was originally written for Black Swallowtail butterflies but because of supply difficulties, use of the Monarch butterfly is now being investigated. Equipment: cage, eggs; Printed matter: teacher's guide; Film: one 16mm, color, silent: Life Cycle of a Butterfly. Six 8mm loops, color: Black Swallowtail Butterfly Egg-Laying, Hatching, and Larvae; Black Swallowtail Butterfly Larval Molt; Black Swallowtail Butterfly Preparing to Pupate (1); Black Swallowtail Butterfly Preparing to Pupate (2); Black Swallowtail Butterfly Emergence.

Trial Teaching Editions

13. Batteries and Bulbs (Grades 5-8) This provides an introduction to the study of electricity and magnetism, in the course of which children investigate such things as ways to light several bulbs with one battery, what happens when more than one battery is used, whether varying lengths and types of wire influence the brightness of bulbs, and the effects different patterns of wires, bulbs, and batteries have on the brightness of bulbs. Equipment: flashlight batteries, small bulbs, various kinds of wire, compasses, magnets; Printed matter: teacher's guide in four books (Circuits I, Circuits II, Circuits and Magnets, Guide to Books)

14. Ice Cubes (Grades 5-6) This unit deals with variations of the general question, "What makes an ice cube melt faster or slower?" Children determine how long it takes an ice cube to melt in the air and in different amounts of water. They see who can keep an ice cube the longest; they explore the melting rates of funny-shaped ice cubes and begin to develop intuitive ideas about surface-volume relations. They collect data and learn a good deal about plotting tables and graphs. Equipment: thermometers, ice, containers; Printed matter: teacher's guide.

15. Melting Ice Cubes (Grades 4-5) This provides an informal introduction to heat and temperature. Children are given half-inch cubes of wood and aluminum to put on ice. By putting stacks of blocks, heated blocks, and cold blocks on the ice, the children try to determine whether the difference in sinking in is caused by weight or by something else. They also melt away whole ice cubes--in air vs. in water, in lots of water vs. a little water, and in big cups vs. little cups. They also use other shapes of ice (flat, round, and crushed) and compare their melting times with cubes of equal weight. Equipment: ice, containers, blocks; Printed matter: teacher's guide.

16. Pendulums (Grades 4-6) This unit uses a frame that supports two pendulums. Working in pairs, children compare the effects of length of string, weight of bob, and amplitude. They find out how long to make the strings in order to double, triple, quadruple the pendulum's period. They study factors that make pendulums die down faster and they also add couplings between the two strings. Equipment: frame, string, bobs; Printed matter: teacher's guide; Film: five 8mm loops, color: Sand Pendulum I: Drawing Circles, Lines and Ellipses; Sand Pendulum II: Drawing on a Turntable; Sand Pendulum III: Drawing Lines on a Traveling Table; Sand Pendulum IV: Slowing Down; Sand Pendulum V: Pouring Sand into Soda Straws.

17. Mystery Powders (Grades 3-4) This unit deals with the properties of various substances and the use of indicators in detecting their presence. Students try to identify some unknown white powders by tasting, smelling, feeling, and comparing them with known substances. Additional investigations with heat, iodine, and vinegar identify specific reactions with several of the powders. To conclude, the children attempt to determine the presence of individual powders when two or more are mixed together. Equipment: sugar, salt, baking soda, starch, plaster of Paris, vinegar, iodine, heat source, containers; Printed matter: teacher's guide.

18. Peas and Particles (Grades 4-6) This consists of a series of classroom activities in counting and estimating. Starting with low numbers and progressing towards "millions and billions," the children estimate beans on paper, rice grains in jars and others. They develop and criticize their own indirect counting methods. Equipment: rice, beans, balls, containers; Printed matter: teacher's guide, charts, set of pictures.

19. Primary Balancing This unit provides some special equipment with which the child can investigate balance and weight explicitly. By working with an assortment of balances--seesaws, pan balances, equal-arm and unequal-arm balances--the child can develop increasingly sophisticated notions of balance and weight. Equipment: walk-on boards, 4-foot boards, pan balances, things to weigh; Printed matter: teacher's guide (The Balance Book), booklet (Mobiles).

20. Changes (Grades 1-4) In this unit children predict what things will change when left by themselves. They make up lists of things that they think will or will not change and then proceed to bring these into class to verify their predictions. During the course of several weeks food becomes garbage, wet metals rust, liquids become cloudy, maggots may appear, and rocks remain rocks. From the nature and timing of these processes the children develop their own sense of biological and physical changes. Equipment: plastic boxes, baby food jars, foods, liquids, metals, crystals, powders, seeds, and other materials; Printed matter: teacher's guide, booklet (What Happens to Trash and Garbage), set of pictures.

21. Drops, Streams, and Containers (Primary) This unit is a guide to play and investigation with liquids. Children examine flow, drop formation, and other properties of water, soapy water, oil, and other available liquids, using a variety of containers, surfaces, drops, and tubes. Equipment: Bottles with holes and caps with holes, eye droppers, medicine cups, tubing, paper towels and wax paper; Printed matter: teacher's guide.

22. Euglena (Grades 6-8) This is a unit in which children are challenged to grow euglena, eventually by themselves, in sterile culture. The activities are organized around such questions as: How do they reproduce? How fast do they grow? Are they plants or animals? Do cultures always die out? Why? Equipment: small bottles, flasks, transfer loops, cotton, microscope slides, pipettes, euglena broth powder; Printed matter: teacher's guide; Film: One 8mm loop, color Euglena Dividing.

23. Rocks and Charts (Grades 3-5) This is a unit in which each pair of children has a set of twenty-one rocks. The children establish

ways of comparing these rocks and set their own standards to define certain properties such as hard and soft, and heavy and light. They make charts telling the rocks' characteristics, and then exchange charts to see if they can read each other's. Equipment: rocks, balances, streak plates, hand lenses and others; Printed matter: teacher's guide.

24. Eggs and Tadpoles (Grades (K-8) In this unit the natural development from fertilized egg to adult frog is examined under classroom conditions. The care and fostering of the animals and the total development of the frog require only a few minutes observation and handling each day, plus an occasional period for discussion and summary. Equipment: fertilized frog eggs, aquaria, pond water; Printed Matter: teacher's guide; Film: two 16mm, color, silent: Frog Development: Fertilization to Hatching; Frog Development: Hatching through Metamorphosis. Eight 8mm loops, color: Frog Egg I: First Cell Division to Early Neural Fold; Frog Egg II: Development of the Body Regions; Frog Egg III: Continued Development to Hatching; Frogs: Pairing and Egg Laying; Artificial Fertilization of Frog Eggs; Frogs: Pituitary Preparation; Tadpoles I; Tadpoles II.

K. MATERIALS AVAILABLE FREE: Approximately 50 copies of each unit, together with the materials necessary to teach a class are supplied free to schools selected for trial teaching. Reprints of several magazine articles describing the work of this project are available and given out free of charge. In addition, a Newsletter is published regularly and sent to a mailing list of about 10,000. Upon request, interested institutions, scientists, or educators are added to this mailing list.

L. MATERIALS PURCHASABLE: (The following items can be obtained from: Webster Division, McGraw-Hill Book Company, Manchester Road, Manchester, Mo.)

1. Behavior of Mealworms	
Teacher's Guide	1.95
Illustrations (Set of 6)	.99
2. Gases and "Airs"	
Teacher's Guide	2.40
Class Kit	49.00
6-Student Kit	21.50
Worksheets (6 each of 16 single sheets)	1.80
Film Loops 16mm (for teachers)	
Gases and "Airs" in the Classroom	126.00
Film Loops 8mm	
Candle Burning I	8.40
Candle Burning II	8.40
Candle Burning Techniques	8.40
The Mouse and the Candle	8.40
3. Growing Seeds	
Teacher's Guide	.99
Class Kit	18.00
Film Loops 8mm	
Bean Sprouts	8.40
Plant Growth-Graphing	8.40

4. Kitchen Physics	
Teacher's Guide	1.95
Class Kit	24.00
6-Student Kit	26.50
Worksheets (6 each of 8 single sheets)	1.62
Film Loops 8mm	
Beading of a Water Column	8.40
Water Rise in Blotter Strips of Graded Width	8.40
Water Rise in Blotter Strips Exposed and Enclosed	8.40
Technicolor Film Loop Projector Model 800-WA	104.50
5. Small Things	
Teacher's Guide	2.40
Class Kit	27.00
6-Student Kits	27.00
Worksheets (6 each of 24 single sheets)	3.99
Set of 20 Illustrations	1.95
The Faithful Eye of Robert Hooke (supplementary book)	.42
Film 16mm	
Paramecium, Euglena, and Amoeba	129.00
Film Loops 8mm	
Paramecium	8.40
Euglena	8.40
Amoeba	8.40
Budding of Yeast Cells	8.40
Blepharisma	8.40
Stentor	8.40
Rotifer	8.40
Vorticella	8.40
Volvox	8.40
Stylonychia	8.40
Comparative Sizes of Microscopic Animals	8.40
6. Microgardening	
Teacher's Guide	2.70
Mold Book	3.30
Cook Book (in revised edition this will be incorporated in teacher's guide)	1.20
7. Bones	
Teacher's Guide	2.25
Picture Book	1.20
Chicken Skeleton Book	.90
10. Light and Shadows	
Teacher's Guide	.90
11. Attribute Games and Problems	
Teacher's Guide	1.80
Set of Materials	12.00
13. Batteries and Bulbs	
Books I, II, III, and IV	6.00
16. Pendulums	
Teacher's Guide	1.80
17. Mystery Powders	
Teacher's Guide	.90

18. Peas and Particles	
Teacher's Guide	1.20
19. Primary Balancing	
The Balance Book	2.70
Mobiles	.90
20. Changes	
Teacher's Guide	1.20
21. Drops, Streams and Containers	
Teacher's Guide	.90
22. Euglena	
Teacher's Guide	.90

Additional 16 mm films, 8 mm loops, and printed materials are expected to be available by the time this reaches print and inquiries about these should be directed to the McGraw-Hill Book Company.

It is expected that arrangements will be completed this spring for releasing film materials on a non-exclusive basis.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Some informal translations have been made into Spanish for use by Peace Corps Volunteers in Colombia, South America. Arrangements for translations in the future will be undertaken by McGraw-Hill Book Company.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using your materials: A total of 500 teaching quantity packages of each of the first five units listed above have been purchased or used in workshops. Fifty of each of these five were trial classes observed closely by us. On the basis of this use, these units have been revised and are currently being distributed commercially by McGraw-Hill Book Company. In addition, almost all of the other published items (18 teachers guides and 6 booklets) have been or are in the process of being tried in approximately 50 classes, to which we supplied the materials, and which are closely observed by us. The balance of these editions, in quantities of 1,000 - 4,000, have been made available for purchase on request, but we have not followed these classes. We can give no exact information on the number of teachers who have used our materials, but we would estimate it to be in excess of 2,500.

b. Some specific schools where course is being taught: Many Schools in the following communities are involved in using ESS units developed so far (we prefer not to have it called a course, since we are not involved in the development of a sequential curriculum): Montgomery County, Md.; Jefferson County, Colo.; Dixie School District, San Rafael, Calif.; Lampoc, Calif.; Wellesley, Mass.; New York, N.Y.; Watertown, Mass.; Lexington, Mass.; environs of St. Louis, Mo.; and Greece, N.Y., among others.

P. MATERIALS PRESENTLY BEING DEVELOPED:

Units Being Prepared for Trial Teaching

25. Observations of Mosquito Larvae (Grade 5) This is a unit in which children observe the metamorphosis of mosquitoes from eggs to adults. Simple experiments are conducted to determine what

environmental conditions of a swamp are favorable for the development of mosquito larvae. A supplementary reading booklet gives a variety of information of mosquitoes that cannot be obtained experimentally. Equipment: containers, mosquitoes, and other; Printed matter: teacher's guide, student booklet (Supplementary Reading for Students). Release of this unit has been delayed because of supply problems.

26. Activity Wheels (Grades 2-5) These are exercise wheels for small animals, to which are attached counters to measure the number of turns the wheel makes. Using an activity wheel, it is possible to gather data on the activity of animals under varying conditions. Some of the factors that can be tested are the effect of activity of: hunger, age, size of cage, noise, light and dark, number of animals, and type of animal. Equipment: activity wheel with counter, cage, animals; Printed matter: teacher's guide.

27. Moonwatching (Grades 2-6) This is an introduction to observational astronomy. During a period of three months the children are given approximately forty notes called "Reminders". Each note describes an event that the children can see in the sky. The children's observations of the moon, sun, a bright planet, and a few easy to find stars are the basis of the study. Printed matter: teacher's guide, booklet (Moon Book), reminders.

28. Playframes (Grades K-2) These are pieces of equipment which provide opportunities for both mechanical and dramatic play within the classroom. Equipment: playframes and accessories; Printed matter: teacher's guide.

29. Balancing (Grades 4-7) This is a unit in which children hang washers on strips of pegboard suspended from a nail. They learn how to identify problems involving balance and to make use of various strategies to solve the problems. An intuitive understanding of moments of force and center of mass underlie the study. Equipment: pegboard, nails, washers, and others; Printed matter: teacher's guide, cards.

30. Pond Water (Grades 3-8) This unit uses as basic material the teeming plant and animal life of fresh water ponds, and gets the students to participate in following the development of representative plants and animals, bringing out the interdependence of organisms concerned and familiarizing the children with representative forms from microscopic plants and animals to the more familiar larger forms. Equipment: pond water, containers, microscopes; Printed matter: teacher's guide, study cards.

31. Geo Blocks (Grades K-5) These blocks were designed to provide children with manipulative materials and experience which can be related to the more strictly academic subject matter, such as: geometric relations; classification; linear, area, and volume measurement and equivalents; and others. A wide variety of shapes and sizes is provided to stimulate expressive building and imaginative visualization of more detailed problems. Equipment: blocks; Printed matter; teacher's guide.

32. The Animal Book (Grades K-3) This describes how three classes used desert animals (gerbils, lizards, kangaroo rats, and chuckwallas). Children consider the animals not only as pets, but observe their behavior and gain some ideas about ecology. The children write, draw,

sing, talk, care for, and take care about their animals. The animals would probably be studied intensively for two months; the caring for and casual observation of the animals might extend through the year. Equipment: cages, animals; Printed matter: teacher's guide, animal care booklet.

33. Brine Shrimp (Grades 1-7) Brine shrimp are tiny, salt lake, arthropods, whose eggs remain viable when dried. Younger children observe the eggs and the minute larvae when they hatch, then watch them grow into adults. Older children can, in addition, explore a number of questions. For example: Do Brine shrimp eggs hatch faster in salt water than in fresh? How do the reactions of brine shrimp toward light change as they grow older? What is their rate of swimming? Because it is so easy to raise hundreds of these animals, statistical answers to many behavioral questions can be found. Equipment: brine shrimp eggs, salt water, containers; Printed matter: teacher's guide; Film one 16mm, color, silent: Brine Shrimp. Two 8mm loops, color: Brine Shrimp I; Brine Shrimp II.

Units In Advanced Development

34. Optics (Grades 6-8) This is aimed at acquainting children with the ideas of reflection, refraction, color, and variations of optical path using many different materials. Experiments with narrow and broad light beams, multiple reflections, colored shadows, and refraction through water lenses are devised and examined. Equipment: light source, mirrors, containers, color filters; Printed matter: teacher's guide.

35. Clay Boats (Grades 3-5) In this unit an attempt is made to acquaint children with some of the problems associated with buoyancy, density, and volume displacement in liquid. Children are given lumps of clay and asked to see if they can make them sink or float. Evenutally children form the clay into boat-like shapes, load them, sometimes sink them, and discover some properties associated with various shapes, sizes, thicknesses, and weights. Equipment: clay, containers, loading materials; Printed matter: teacher's guide.

36. Heating and Cooling (Grades 5-7) This unit is concerned with heat and heat phenomena. The developmental teaching is aimed at problems of heat transfer and loss using various heat sources and materials. Equipment: measuring instruments, various metals, heat source; Printed matter: teacher's guide.

37. Crayfish (Grades 5-6) This unit uses the common, readily available crayfish as a typical representative of the fresh water environment and yeilds to the students an understanding of the feeding habits, reaction and relations to the environment of these animals which are readily managed, maintained, and observed in the classroom. Equipment: crayfish, containers; Printed matter: teacher's guide.

38. Pattern Blocks (Grades K-5) This unit consists of a set of blocks of wood in the shapes of regular polygons: triangles, squares, trapezoids, diamonds, hexagons, with each shape painted its own color. There are many patterns and designs which can be made with these blocks, and this gives great scope for children to build large triangles or diamonds or trapezoids out of the blocks, and arithmetical questions arise as to the relation of the length of the side of the figure to the number of blocks needed. A group of elegant geometri-

cal questions can be posed about repeating patterns and symmetries. Equipment: blocks; Printed matter: teacher's guide.

39. Snowflakes (Grades 4-6) This unit uses a recently developed technique of obtaining replicas of snowflakes which are caught as they fall on special plastic cement. It has been successfully carried through one winter in schools. The basic structure of snow crystals, the exquisite beauty and symmetrical pattern of the several different types which are the result of stmospheric conditions at high altitudes give the students an appreciation of the diversity of patterns and foster reproducing these by paper cutouts and other means. Equipment: plastic cement, paper, snow; Printed matter: teacher's guide.

40. Sink and Float (Grades 4-6) The materials in this introduction to density of solids and liquids consist of things that sink and things that float in tap water and salt water. Among the things that sink in tap water are some that float in salt water. By working with materials and liquids of different densities and by varying densities, e.g., by adding Plasticine to a solid object or salt to water, it becomes apparent that whether or not an object will or will not float depends jointly upon its density and the density of the liquid into which it has been placed. Construction and use of hydrometers is one possible extension. Equipment: containers, Plasticine, materials of different densities, salt; Printed matter: teacher's guide.

41. Colored Solutions (Grades 5-6) By using various concentrations of salt solutions identified by color, this unit attempts to introduce children to some phenomena which will lead them to perform experiments associated with the ideas of density and the layering of liquids. The results of their experiments form a foundation of facts from which they may make predictions and draw conclusions as they tackle new activities. Equipment: plastic trays and cylinders, salt solutions, eye droppers, and food coloring; Printed matter: teacher's guide.

42. Budding Twigs (Grade 6) In this unit children observe the first budding of a large collection of twigs. Water supply, light, temperature, length of twig, position of bud, and other such possible growth factors are considered. Equipment: twigs, containers; Printed matter: teacher's guide, children's book (Buds and Twigs).

43. Bending Plants (Grades 4-6) This unit deals with the responses of oat seedlings to light and gravity. Children do experiments to establish changes in direction of growth of stem and roots and the rate at which they occur under controlled conditions. Equipment: oat seedlings, containers, vermiculite, slides, cellophane tape; Printed matter: teacher's guide.

44. Balloons and Gases (Grades 6-8) Children prepare gases which are captured in plastic bags, balloons, and weather balloons. The gases are weighed and tested by various chemical means so that children become aware of the relative densities and methods of identifying the gases. By weighing air, lung air, carbon dioxide, and hydrogen in different atmospheres, the buoyant effect comes into play. By weighing balloons filled with different liquids in "atmospheres" of various liquids, children become capable of predicting the rela-

tive densities of the liquids. They then check their predictions empirically. Equipment: balances, balloons, plastic bags and containers, flasks, and various chemicals; Printed matter: teacher's guide, worksheets, experiment sheets.

45. Structures (Grades 3-7) In this unit children are allowed to work leisurely with materials. As the children build with materials (newspaper, clay, sticks, scotch tape, and others), they begin to see the relationship between material, function, and form. By slowly working with a set of various materials, a wide range of experience is provided. Equipment: clay, straws, string, Plasticine, paper, tape, and other; Printed matter: teacher's guide.

46. Dipping Birds (Grades 5-8) This unit capitalizes on some of the other phenomena which have been brought out in another unit, Kitchen Physics. The phenomena are absorption, capillarity, and the equilibrium which may be reached between these processes in blotters and other absorbent material. The dipping bird is constructed of a piece of blotter which is then weighted so that the whole bird will function as a scale or balance. Many avenues of investigation are opened by allowing children to experiment with the size, the shape, and the fluid into which the bird is dipped; the way in which it is suspended; the temperature; the relative humidity in the room; and the amount of air blowing past the bird. Equipment: plastic straws, rubber stoppers, dowels, balloons, blotter materials, and other; Printed matter: teacher's guide.

47. Printing Press (Grades K-2) This is a movable-type press on which children compose, select, type, and print their work. This press can support work in all subject matter areas in addition to science. Lower grade children, particularly, are stimulated to learn to read and write and observe. Equipment: press, type, printing ink, type rack, ink rollers, and accessories; Printed matter: teacher's guide.

48. Silk Screen Printing (Grades K-2) A silk screen mimeograph-type press is used to support classroom activities of children. The inexpensive stencils make it possible for any kind of drawing and written work of the children to be reproduced. Equipment: press, roller, paper; Printed matter: teacher's guide.

49. Approximation #1 This is a booklet with photographs of a specimen Head Start classroom with lists of the materials needed to equip it. It illustrates what can be done with simple equipment in a short time and with limited funds.

50. Tangram (Grades K-8) This is an ancient Chinese geometrical puzzle. Seven pieces are formed from the dissection of a square: two small triangles, a medium triangle, two large triangles, a square, and a rhomboid. A great many geometrical arrangements can be made from these seven pieces. This unit is an adaptation which starts with various subsets of the full seven piece set and supplies "analysis" cards which will help children become familiar with certain basic combinations. There is a wide range of difficulty in the hundred or so cards which are provided along with the geometrical shapes. Equipment: tangram pieces; Printed matter: teacher's guide, card sets.

51. Beans and Peas (Grades K-4) This is a booklet to enable teachers

to grow beans and peas in their classrooms. Bean seeds of many different varieties obtained from the local grocer's shelf will grow into adult plants in about six weeks. Any classroom in practically any weather can boast of flowering bean plants which bear pods with seeds. The booklet, primarily designed to insure the class a supply of healthy plants, also contains teaching suggestions for children's observations and individual projects. Photographs of the plant at various stages of its development and accounts of our laboratory experience give the teacher an idea of what to expect and when.

Units In Early Development (Active)

52. Rates and Changes (Grades 7-8) This unit attempts to make students aware of the commensurability of counting rates and duration of experiment. Various kinds of time units should be recognized as natural and appropriate. To use these in an experiment one must have some feeling for the extent of the experiment and the duration of the phenomena. A wide range of physical, chemical, and biological phenomena is used to acquaint children with processes of different rate and of various duration.

53. Solids and Solutions (Grades 4-5) The activities here involve the student in exploring solids that do and do not dissolve in water; determining how much salt will dissolve in a given amount of water; and watching crystals gradually reappear as water evaporates. Later activities emphasize what happens to the water level when solids dissolve in water. Additional information on the basic elements of crystal growing is included.

54. Daily Reminders (Grades 2-6) These point out the many familiar, but overlooked, things to see, describe, and think about outside of school. Sunsets, shadows, easy-to-find stars and planets, the moon, frost, snowflakes, raindrops, puddles, birds, and plants are examples. Seen again and again, these observations become the basis for sensing degrees of regularity or periodicity in nature. Predictions become possible questions have a new context, and causal connections are made. This unit is pre-science, anticipating later work in positional astronomy, meteorology, and biology.

55. Slips and Slides (Grades 5-6) Children establish "slipperiness" orders by determining the force needed to move blocks with different surfaces along several types of horizontal plane. Additional problems include the effects of weight and surface area on frictional forces; the effect of an inclined plane on the forces needed to move bodies; the utilization of wheels in reducing friction, and the need for experimental controls. Children are asked to predict on the basis of the empirical information they have acquired. Readings involving some classical experiments in friction, as well as some theories of friction, are provided along with experiments which can be performed at home.

56. Introduction to Lenses (Grades 2-4) By looking through water drops and air bubbles, children observe the phenomena of magnification and minification. They investigate the curvature of transparent materials and their relationship to these phenomena.

57. Mapping (Grades 6-7) By examining methods of transforming and transmitting various types of information (particularly two-dimensional representatives of three-dimensional objects), students

concern themselves with pattern recognition, scaling, congruence, ordering, discreteness, similarity, barriers, boundary conditions, and distortions. Vehicles for doing this include: student gathered information about their "world", maps, air photos, analyphs, sand-stream tables, and numerous other tools.

58. Mushrooms (Grades 4-6) This is a unit on growth and reaction. The children are given an opportunity to study a farily large non-green plant, a mushroom. The mushroom grows on sterilized oat grains and produces a fairly large, easily recognized fruit body. The children work with the mushroom to answer the questions they pose as the unit develops.

59. Musical Sound (Grade 6) This unit attempts to deal with some of the physical phenomena and mathematical relationships involved in the production of musical sounds. Using simple musical instruments as experimental devices, the unit focuses on the concepts of frequency and wavelength. A simpler unit on musical instruments for primary grades will probably develop from this work.

60. Stream Tables (Grades 5-7) This unit is divided into three study areas: 1. properties of earth materials as observed when in contact with water in various states of turbulence. Erosion, deposition, wave action, current action, and erosion-deposition feature development are examined; 2. Engineering geology case studies are examined and various conservation problem areas in the world are modeled on the stream table. The students are asked to offer and test possible answers to problems based on their experiences in 1. above; 3. Planning the use of additional case studies and problems, students are asked to explore the limitations of an analogy.

61. Tree Seeds (Grades 2-3) Tree Seeds is designed to follow up the common autumn activity of seed collecting. It can be continued through the whole year. The children can identify some of the tree seeds by looking at the leaves and twig shapes of the seedlings they grow. They may also find the some seeds need special conditions such as a cold period, a lot of moisture, or rough handling before they can sprout.

62. Tree Insects (Grades 4-6) This unit on insects found in trees developed naturally from our work with "Budding Twigs". Many insects at various stages of development are readily available, particularly in late spring. Leaf miners, leaf rollers, and tent caterpillars, among others, make excellent subjects for study.

63. Water Cells (Grades K-2) Plastic containers with fixed interior partitions are filled with water colored with vegetable dyes. The amount of water looks different in one section of the cell than it does in another, although the child can see that nothing has been added or taken away. The addition of detergent and/or particles whose density is close to that of water helps reveal the dynamics of the fluid flow. Bubbles and soap films are formed as the liquid is poured from one section of the box to another and the motions of different parts of the stream are revealed by the particles. The interaction between air and liquid in this closed container is interesting to observe and difficult to predict.

64. Sand (Grades 2-5) This is a unit which uses graded, colored sand which, appealing aesthetically, invites a wide variety of ex-

plorations of a scientific nature. Sand can be thought of as analogous to water, and poured, measured and dripped. Sand can also be sorted, piled, looked at through a hand lens, rolled down various surfaces, strained, crushed, and massed. Children make sand clocks, sandpaper, sand sculpture, and sand pendulums. Sand is seen as a material for primary classrooms which would invite children to explore it, write about it, use it as an art medium, and in various ways to use it to inter-relate many aspects of their school day.

65. Earthworms (Grades 4-7) This is one of a group of activities which offer children the opportunity to uncover various relationships between an organism and the environment through experiments which evaluate the organism's response to a choice of environmental factors. In this unit children learn something of the behavior and biology of earthworms on a statistical basis by placing them in inexpensive plastic "choice" tubes. Various different conditions are established at either end of the tubes, e!g., dry sand vs. damp humus, light vs. dark. The children insert earthworms into the tubes at midpoint and observe preferences when given a choice of conditions.

66. Matrix Blocks (Grades K-8) These are of three kinds--cylindrical, square, and rectangular. Each of these subsets can be assembled to form a matrix in which there are common dimensions in the rows and in the columns. The cylinders can be matrixed quite easily and children often discover how to do it spontaneously. The pieces with a square cross-section, however, are much more difficult to classify in two ways simultaneously because they can be placed in different orientations. The third set, having a rectangular cross-section, is very difficult.

67. Measuring (Grades K-3) This unit uses assorted straight edges and wheels; some of which do in fact measure the same length as a ruler, yearstick, meter, and various divisions of these standard units. These materials have no units marked on them. It is expected that the children will quickly learn which measuring device is appropriate to a task. Skills of estimating spatial and linear relationships and transposing from one unit to another without ever naming those units should help the children gain a sound basis for using standard units of linear measurements.

68. Chemistry (Grade 7) Children closely examine four chemicals: baking soda, baking powder, vinegar, and water. Students consider the volumes of gas produced by specific volumes of materials whose reaction is allowed to go to completion. They consider which of the reacting substances needs to be added for the reaction to continue. They also do quantitative experiments controlling the end results (volume of gas produced). A new set of materials, magnesium ribbon and 5% hydrochloric acid, then provides them with a chance to compare their experience with another reaction which is both similar and different in terms of volume of gas produced, end of reaction, and the properties of the resulting gas.

Units In Early Development (Inactive)

69. Marine Animals (Grades 3-6) Children are given an opportunity to study live marine organisms first-hand in the classroom. ESS is attempting to assemble an inexpensive aquarium (utilizing commercial salt formulae) that will be cheap enough to be practical and a coll-

ection of organisms that will survive for a considerable period of time under classroom conditions. Much of what children learn about the sea animals occurs as they watch them and feed them. In addition to these rather casual observations, experiments are performed to determine the response of the organisms to changes in environmental conditions and to other artificial stimuli.

70. Checkerboard (Grade 4) This offers students large (11 inch diameter) styrofoam discs to use as "checkers". They design a checkerboard to scale, solving problems of standardized units and geometric dimension as they do so. Subsequently, they take one square as a whole checkerboard and design and scale a suitable checker for it. They repeat this process once more, scaling down one square of this second checkerboard to a miniature board and checker of suitable dimensions. There are interesting exponential relationships between the three side lengths, the three board areas, and the three checker volumes. In the course of playing games on these three boards the need for the formation of coordinate systems on the smallest and largest becomes apparent in order for opposing players to be able to exchange information.

71. How Thick is a Soap Bubble? (Grades 6-8) This is a series of laboratory exercises with sticks, strings, paper, tape, discs, spheres, and others used to teach the concepts of linear area and volume measurement, and their relation to each other. Several laboratory applications of area/volume relations are considered. Finally the students are able to compute the volume of a small amount of soap liquid in a capillary tube. From this, if they blow a soap bubble so that it breaks on a desk top leaving a wet surface, they can then compute the thickness of the soap bubble from their measurement of its diameter combined with their previous knowledge of the volume of soap used.

72. The Orion Book (Grades 5-8) This is a book of photographs for children. It shows many of the sky phenomena--planets, satellites, the ecliptic, the moon, nebulae, even galaxies--all in relationship to that familiar landmark, Orion. It has Orion on old star charts, showing that the constellation was seen at places far distant in time and space. The children learn to learn from photographic evidence, a little like real astronomers.

73. Duckweed (Grades 3-8) This plant is large enough to be observed without magnification, but small enough to grow rapidly and noticeably within a few days. Tap water kills it quickly; distilled water keeps it alive for a week, but soil water allows it to grow (given plenty of light) for several months. It is easy to try different mineral salts to grow the duckweed, and some of the basic properties of plant nutrition emerge.

74. Thermometry (Grades 4-6) This unit attempts to acquaint children with a wide variety of instruments that can measure changes in temperature: metals expanding, bi-metallic strips, color-change thermometers, and liquid and gas expansion thermometers are some of the kinds that are introduced. Children begin by experimenting with their fingers in hot and cold water and then look at ice cubes and sugar melting or dissolving into solution. They invent thermometers using principles they have learned from experimentation with bi-metallic strips.

75. Metallurgy (Grades 3-6) In this unit an attempt is made to get at some ideas associated with bulk properties of metals: density, hardness, bulk modulus, torsion modulus, and others. The children are able to construct very simple equipment to test elastic strength, breaking strength, crystalline properties, and other physical attributes.

76. Time and Clocks (Grades 3-5) This is a sub-unit associated with Rates and Changes. Children make various kinds of counting and time-keeping instruments. Sand clocks, water clocks, vibrating clocks, and oscillating clocks are all useful in giving some sense of time and its span.

77. Counting to the Slide Rule (Grades 7-8) This unit is designed to make students aware of the possibilities of estimating and approximating large numbers and leads to the ideas of exponential notation and order-of-magnitude scales. The work with order-of-magnitude scales and comparison of them with the ordinary number line scales lead to a description of some experimental results in logarithmic rather than linear terms. The students arrange these results on a scale and find out that the order of magnitude or logarithmic spacing that accompanies their computations can be used in multiplicative and divisive ways for computation.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A number of communities have undertaken their own programs in the training of teachers of elementary science. In most cases, on our recommendation, these programs have included the work of other national programs as well as the ESS materials. Usually these are conducted as demonstration schools with a group of anywhere from 30 - 100 teachers (sometimes as part of a course in a local university) participating as observers, exemplary teachers, and seminar members. Such programs have been conducted in Monterey County, Calif.; Cardozo Model School District, Washing, D.C.; Greece, N.Y.; Abington, Pa.; and Webster College, Webster Grove, Mo., among others. In addition, week-long in-house workshops are conducted periodically for school administrators, science supervisors and the like to familiarize them with our materials and their use so that they may conduct workshops for teachers in their local schools. We hope to be able to do more in this area in the future.

R. PROJECT EVALUATION:

a. Instruments used: Our persistent feeling has been that traditional evaluative instruments do not measure the most significant aspects of a child's learning and development. In addition, we believe that the validity of currently available objective instruments with such a manipulative classroom experience as our materials provide is questionable. Some extension of the case study method of making evaluations will probably be the basis of the research that we do. We have now begun to make arrangements with people undertaking research programs to concern themselves with the design of such evaluative instruments for our work.

b. Control groups: In the one formal case study that we made with fifth grade classes in Wellesley, Mass., we worked with two classes at once: one with Elementary Science materials and one with the standard science materials assigned to that class. We expect to continue to examine parallel groups whenever and however we do make our studies.

c. Feedback process: We have an extensive feedback process in evaluating the booklets and materials themselves from the point of view of teachers. Our primary purpose for this has been to make revisions before commercial release. What we have done is provide teachers with a set of materials and ask them to teach the materials. We then provide them with detailed questionnaires about the content and format of a particular unit. In addition, we visit the classrooms and do anecdotal reports. We also interview the teachers since we find that statements made face-to-face do not always exactly duplicate those which are written down on questionnaires.

d. Behavioral objectives identified: We have defined some. We feel that if the materials are well designed children will be deeply involved and highly motivated to continue with the work. We use such criteria as noise level, general order, attention to the work at hand, and design of new experiments by the children. We also have as objectives an increase in problem-solving skills, an improvement in the ability to face a new set of materials and begin an investigation into questions asked, an improvement in the ability to predict what will happen under certain experimental conditions with the materials involved.

e. Research evidence of objectives achieved: Our evidence comes from anecdotal reports from teachers and from close and lengthy observations made by our own staff in classrooms.

f. Other pertinent information: We have had the consistent experience that in class groups where there are some children who are non-verbal or otherwise unsuccessful with their day-to-day school work, we have made some impact on these children. We have evidence that such children begin to read better and, in fact, begin to perform better in many of their other school tasks. We attribute this to the change in the child's view of himself--where he has been uniformly unsuccessful he has now had a successful experience in school. He begins to have some sense of his own potential power with other materials as well as these.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: 1. Commercial publication of first 5 units by McGraw-Hill Book Co. 2. Revision of 12 additional books has been undertaken and they are being released with equipment kits where applicable to McGraw-Hill Book Company for commercial publication (Microgardening Teacher's Guide, Illustrated Handbook of Some Common Molds; Bones Teacher's Guide, Bones Picture Book, How To Make a Chicken Skeleton; Light and Shadows, Mirror Cards, Curious Gerbils, How Barn Owls Hunt, How A Moth Escapes from Its Cocoon, Butterflies, Attribute Games and Problems). 3. Preliminary publication of 5 more trial teaching editions (Changes; Drops, Streams and Containers; Euglena, Rocks and Charts; Eggs and Tadpoles) which were all extensively taught while in the developmental process prior to this publication. 4. Manuscripts are being prepared for trial teaching editions for another 9 units. 5. Approximately 18 new units have been initiated and development has proceeded on other units previously listed. 6. Summer workshops were conducted in the Cardozo Model School District with the support of O.E.O. and in the Dixie School District, San Rafael, Calif., under their sponsorship. 7. Peace Corps programs for the training of teachers were held as follows: one for the Philippines in elementary science, one for Ethiopia in secondary math and science beginning at about grade six, one for Nigeria in secondary math, sciences, French, English and history, and one for Ghana in secondary math, sciences, French, and English. 8. Experimental on-the-site classroom films in Cardozo Model School District (Classrooms in Transition) and in Wellesley, Mass., (Another Way to Learn) were completed. Another one has been started. 9. Two summer demonstration schools in Cambridge to provide trial classrooms for development and realistic workshop situations for Peace Corps Groups. 10. Seven in-house workshops have been held for school administrators and other groups. 11. Support to schools and school systems who initiated their own workshops in the form of materials and/or staff, averaging 3-5 per month. 12. Program with Cardozo Model School District was carried out in the spring of 1966 and continues again this year under a grant from O.E.O.

T. PLANS FOR THE FUTURE: 1. Completion for preliminary publication of trial teaching editions of about ten units during the year 1967-68. 2. Revision of 10-12 units based on feedback of existing trial teaching editions during the year 1967-68. 3. Continuing progress on units in various stages of development and initiation of new units. 4. Continued support to Peace Corps programs. 5. Continued support to schools and school systems as requested for workshop materials and leaders, and in-service programs. 6. Additional in-house workshops and experimentation with teacher training programs. 7. Continued efforts toward design of evaluative instruments for our work. 8. Continued work on experimental classroom and content films, and film loops to accompany new units. Information on the film program may be requested from, Films: Elementary Science Study, 55 Chapel St., Newton, Mass. 9. Plans are being formulated for a summer program in teacher education.

A. PROJECT TITLE: ENGINEERING CONCEPTS CURRICULUM PROJECT (ECCP)

B. PROJECT DIRECTORS: E. E. David, Jr., Exec. Dir., Communications Systems Res. Div., Bell Telephone Laboratories, Murray Hill, N. J. 07971, Tel. 201-582-4025; J. G. Truxal, Provost, Polytechnic Inst. of Brooklyn, 333 Jay Street, Brooklyn, N. Y. 11201, Tel. 212-643-2164

C. PROJECT HEADQUARTERS:
   a. Address: ECCP-Box 100, Polytechnic Institute of Brooklyn, 333 Jay Street, Brooklyn, N. Y. 11201, Tel. 212-643-5360, Contact: Assoc. Directors: E. J. Piel or B. A. Sachs
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: E. J. Piel, Associate Project Director; B. A. Sachs, Associate Project Director; Manfred Brotherton, Assistant; Ludwig Braun, Lab. Development

E. PROJECT SUPPORT:
   a. Organizational sponsorship: Commission on Engineering Education
   b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
   a. Principal originator: Commission on Engineering Education
   b. Date and place of initiation: Summer 1964, Washington, D. C.
   c. Reason for initiation: We believe that a pure physics course, however good in itself, leaves a considerable gap in pupil's understanding of the impact of physical science on the real world. As engineers, the Commission flet there was another approach - one that would tie the physical principles to the man-made world, tie them in with the study of systems, process and devices man has created in order to cope with nature.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: See F above

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Grade levels 11-12; Subjects: logic and computing, models, programming, optimization, amplification, stability, feedback and control, etc.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. ECCP Newsletter
   2. ECCP Brochure

K. MATERIALS AVAILABLE FREE:
   1. Newsletters
   2. ECCP Brochure
   Commission on Engineering Education, 1501 New Hampshire Ave., N.W.
   Washington, D.C. 20036

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 28

b. Some specific schools where course is being taught: Monroe Senior High School, Monroe, Wis.; Needham Broughton High School, Raleigh, N. C.; Nazareth High School, Brooklyn, N. Y.; Reagan High School, Houston, Tex.

P. MATERIALS PRESENTLY BEING DEVELOPED: 3. The Man-Made World (text)

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: 1967 only: University of Colorado teacher orientation program

R. PROJECT EVALUATION:

a. Instruments used: Evaluation being devised by Educational Testing Services, Inc.

b. Control groups: None listed

c. Feedback process: Periodic meetings are held with teachers teaching the course

d. Behavioral objectives identified: None

e. Research evidence of objectives achieved: Acceptance and demand

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The project has been expanded to include an additional 23 schools whose teachers underwent a special teacher orientation program at the University of Colorado during the summer of 1966.

T. PLANS FOR THE FUTURE: Expand number of schools; encourage summer institutes to be held by universities for teacher training, text publication by 1968.

A. PROJECT TITLE: FLINT HILLS ELEMENTARY SCIENCE PROGRAM DEVELOPMENT PROJECT

B. PROJECT DIRECTOR: Gerald L. Abegg, Kansas State Teachers College, Emporia, Kan. 66801. Tel: 316-DI 2-1342.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B. Contact Project Director.
   b. Facilities available for viewing: A center for in-service education of teachers has been established on the KSTC campus. It is open to visitors.

D. PRINCIPAL PROFESSIONAL STAFF: Gerald L. Abegg, Project Director; Glenn H. Crumb, Research Coordinator.

E. PROJECT SUPPORT:
   a. Organizational sponsorship: Flint Hills Educational Research and Development Association (an organization of 13 Unified School Districts in a 7-county area).
   b. Funding agency: Title III, ESEA, U. S. Office of Education.

F. PROJECT HISTORY:
   a. Principal originators: Gerald L. Abegg; Glenn H. Crumb.
   b. Date and place of initiation: Submitted January 15, 1966; Funded June 1, 1966; Flint Hills Association, Emporia, Kansas.
   c. Reason for initiation: To improve the science programs and instruction in the 60 elementary schools of the association.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop a system of exemplary instructional programs in science; to develop a program of studies for the upper elementary (6, 7, 8) grades in a seven-county rural area; to provide teachers in these schools with: consultant services, subject matter training, and assistance in developing a coherent modern program of studies in science; to establish communication between teachers, science educators, curriculum developers and scientists.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: All science areas in grades 6 through 8.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Field Guide to Geology of East Central Kansas.
   2. General Information Pamphlet.

K. MATERIALS AVAILABLE FREE: 2. Project Headquarters "C" above.

L. MATERIALS PURCHASABLE: 1. $1.00 includes mailing and handling - project headquarters "C".

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS: 60 teachers are using the materials.

P. MATERIALS PRESENTLY BEING DEVELOPED:

3. Field Guide to Flora of East Central Kansas.
4. Field Guide to Fauna of East Central Kansas.
5. Film and Slide Sets of the Geology of the State of Kansas.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Since our project is largely teacher-oriented, the principal activities are in-service programs for the cooperating teachers. The principal phases of these programs are: (1) 6-week subject matter training session at KSTC; (2) 5-week summer workshop on developing the program; (3) 6-day-long evaluation workshops during the school year. This sequence will be followed for each of the three years the project is operating.

R. PROJECT EVALUATION:

a. Instruments used: STEP Science Test Form 4A and 3A; TOUS Form Ew, OTIS Mental Abilities Test.
b. Control groups: Yes
c. Feedback process: Six workshops are held during the school year for the teachers to analyze the effectiveness of the materials utilized.
d. Behavioral objectives identified: Pupil progress in science; pupil gain in understanding of science; changes in instructional procedures, and gains in teacher training and competence.
e. Research evidence of objectives achieved: Data is currently being collected and analysis of first year of the project will be completed by July, 1967.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: 6-week subject matter session for teachers; 5-week workshop on program development; 4 of the 6 evaluation sessions.

T. PLANS FOR THE FUTURE: The second summer program will concentrate on the earth sciences and the third year will concentrate on the biological sciences. Teaching guides and related materials will be developed during these sessions.

A. PROJECT TITLE: 1965-66 GENERAL MATHEMATICS I & II WRITING PROJECT

B. PROJECT DIRECTOR: George Hudson, Albuquerque Public Schools, P. O. Box 1927, Albuquerque, New Mexico 87103. Tel: 505-842-3656.

C. PROJECT HEADQUARTERS:

a. Address: Same as B. Contact Project Director.

b. Facilities available for viewing: Classroom use of numerous teacher-written units in General Mathematics I and II.

D. PRINCIPAL PROFESSIONAL STAFF: George Hudson, Consultant, Secondary School Mathematics; 9th & 10th Grade Instructors: Sidney Humble, Grant Jr. High School; Beneranda Mora, Rio Grande High School; 11th & 12th Grade Instructors: Geneva Ellis, West Mesa High School; Charles Burdick, Valley High School.

E. PROJECT SUPPORT:

a. Organizational sponsorship: Albuquerque Public Schools.

b. Funding agency: Title I of Elementary-Secondary Education Act, U. S. Office of Education.

F. PROJECT HISTORY:

a. Principal originators: Consultant and instructors of secondary school mathematics, Albuquerque Public Schools.

b. Date and place of initiation: January 1, 1965. Albuquerque, New Mexico.

c. Reason for initiation: Scarcity of interesting and appropriate mathematics materials for use with less-able grade 9-12 pupils.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Preparation of mathematically sound, updated content of a difficulty level appropriate for use with less-able high school pupils; Unique characteristic - Units were written by instructors who had been teaching the general mathematics pupils with whom the content was to be used in 1965-66 and 1966-67.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: General Math I & II; grades 9-12; 14-18 years.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: A unified group of approximately 600 pages in each of General Math I and II. This is content for study by pupil. Pages are punched for looseleaf binder and are collated and stapled by units.

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: Not yet available.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No translation plans.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Approximately 30.

b. Some specific schools where course is being taught: Grant JHS, Rio Grande HS, Valley HS, West Mesa HS.

P. MATERIALS PRESENTLY BEING DEVELOPED: Separate units are being corrected and amplified.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None, other than willingness to use the material insightfully and with appropriate empathy for pupils.

R. PROJECT EVALUATION:

a. Instruments used: SRA arithmetic computation and concept test used in pre-testing and post-testing.

b. Control groups: None.

c. Feedback process: Each unit is accompanied by a rating sheet. Individual instructors complete and return rating sheet to Consultant who tabulates responses for system-wide performance picture.

d. Behavioral objectives identified: Expressed and observed attitude of pupils toward study of mathematics; pupil success in mastering the content.

e. Research evidence of objectives achieved: Unit rating-sheets indicate improved pupil attitude, and teacher opinion that difficulty of content can be increased for use in schools attended by culturally-advantaged general math pupils.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Hopefully, the school system plans to continue the writing and printing of additional appropriate units.

A. PROJECT TITLE: THE GREATER CLEVELAND MATHEMATICS PROGRAM OF THE EDUCATIONAL RESEARCH COUNCIL OF GREATER CLEVELAND (GCMP)

B. PROJECT DIRECTOR: George S. Cunningham, 446 Rockefeller Bldg., 614 West Superior Ave., Cleveland, Ohio 44113 Tel: 216-241-0781

C. PROJECT HEADQUARTERS:
a. Address: Rockefeller Building, 614 West Superior Ave., Cleveland, Ohio 44113 Tel: 216-241-0781. Contact Mr. George S. Cunningham.
b. Facilities available for viewing: Classes in participating schools.

D. PRINCIPAL PROFESSIONAL STAFF: William T. Hale, Assistant Director; Research Associates: Charles Buck; Lucy Davis; S. Edwin Humiston; Lucille McGraith; Rae Marie Parsons; Margaret Russell.

E. PROJECT SUPPORT: The Cleveland Foundation; Grant Foundation; Martha Holden Jennings Foundation; Charles F. Kettering Foundation; Lubrizol Foundation, and others.

F. PROJECT HISTORY:
a. Principal originator: Dr. George Baird.
b. Date and place of initiation: 1959, Cleveland, Ohio.
c. Reason for initiation: First request of Participating School Superintendents for the improvement of education.

G. PRESENT COMMERCIAL AFFILIATIONS: Some of the GCMP materials are published by Science Research Associates.

H. PURPOSES AND SPECIFIC OBJECTIVES: The improvement of mathematical understanding and competency for all students. An articulated and sequential program in mathematics for Kindergarten through Grade 12. The pupil in GCMP is provided the opportunity and resources to think his way through mathematics and to see mathematics as a structured subject rather than isolated bits of information to be memorized.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics for Kindergarten through Grade 12.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Kindergarten Work Sheets and Teacher Guide.
2. Primary Series for Students with Teacher Guides for Grades 1, 2, and 3.
3. Intermediate Series with Teacher Guides for Grades 4, 5, and 6.
4. Pre-Algebra for Junior High.
5. GCMP Geometry.
6. GCMP Tests.
7. Bulletins: "What Good Teaching Does"; "Have You Done Your Homework?"--A Primer for Parents; "Greater Cleveland Mathematics Program"; "GCMP Geometry".

K. MATERIALS AVAILABLE FREE: Educational Research Council: GCMP Geometry; GCMP Bulletin; Greater Cleveland Mathematics Program.

L. MATERIALS PURCHASABLE: See order form of Science Research Associates, Inc., 259 E. Erie St., Chicago, Ill. 60611, for items 1, 2, and 3.

4. Pre-Algebra for Junior High available only to Council schools.

5. GCMP Geometry - Educational Research Council, 614 West Superior Ave., Cleveland, Ohio 44113: Student Book (4 Volumes) $6.00; Teacher Guides (4 Volumes) $15.00.

6. See order form of Science Research Assoc.

7. Educational Research Council - "What Good Teaching Does" - 40 cents; "Have You Done Your Homework" - 50 cents.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Some plans for translation into Arabic and Spanish.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 2300 in participating schools of the Educational Research Council, plus several thousand others throughout the United States.

b. Some specific schools where course is being taught: Aurora, Bay Village, Berea, North Olmsted, and Rocky River, Ohio; Bradford, Pa.; Brockton, Mass; Muskegon and Niles, Mich.

P. MATERIALS PRESENTLY BEING DEVELOPED: 8. Films for student use and teacher training.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION:

1. In-service courses: Mathematics and pedagogy of grade level; Participating schools.

2. Teacher Conferences: One week in duration; Pedagogy and mathematics of grade level; Cleveland, Ohio.

R. PROJECT EVALUATION:

a. Instruments used: Tests written by the testing department of the Educational Research Council and by GCMP staff members.

b. Control groups: For small experiments of portions of the program.

c. Feedback process: Staff visits to teachers using experimental material. Group conferences with teachers using experimental materials.

d. Behavioral objectives identified: Student awareness of mathematical structure.

e. Research evidence of objectives achieved: None described.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Development of high school mathematics texts for all students.

A. **PROJECT TITLE:** HARVARD PROJECT PHYSICS (HPP)

B. **PROJECT DIRECTORS:** Exec. Director - F. James Rutherford, Pierce Hall, Harvard University, Cambridge, Mass. 02138. Tel: UN 8-7600, X3281. Codirectors - Gerald Holton and Fletcher Watson (same address).

C. **PROJECT HEADQUARTERS:**

a. Address: Same as B. Contact F. James Rutherford.

b. Facilities available for viewing: Reading room in which copies of all of our materials can be studied at Project Headquarters.

D. **PRINCIPAL PROFESSIONAL STAFF:** F. James Rutherford, Gerald Holton, Fletcher Watson, Project Codirectors; Andrew Ahlgren; John Harris; Banesh Hoffmann; Richard Mara; Morton Schagrin; Wayne Welch; Stephen Winter; Herbert Priestley, and Franklin Miller.

E. **PROJECT SUPPORT:**

a. Organizational sponsorship: Harvard Graduate School of Education.

b. Funding agencies: U. S. Office of Education; National Science Foundation; Carnegie Corporation; Sloan Foundation.

F. **PROJECT HISTORY:**

a. Principal originators: Gerald Holton, F. James Rutherford, and Fletcher Watson.

b. Date and place of initiation: July, 1964. Cambridge, Mass.

c. Reason for initiation: Concern for the small and decreasing enrollment in physics at all levels, plus a feeling that there ought to be available to students at least one general education version of a sound physics course.

G. **PRESENT COMMERCIAL AFFILIATIONS:** None

H. **PURPOSES AND SPECIFIC OBJECTIVES:** Project Physics course is intended for a very large audience of students. Hopefully, it will be attractive to and suitable for at least 1/2 of the students in high school. It is being designed so that its appeal is not limited to merely the brightest and most science-oriented students. The Physics is being presented in a variety of ways. It is intended to show physics as a human activity and to view that activity in some historical and philosophical perspective. In doing this, a multi-media, multi-model approach is being used in order to make possible flexibility of design. In this way, it is expected that the purposes of individual students have a better chance of being served.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** Introductory physics course for high school and junior college students.

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:**

1. 6 basic text units
2. 6 teacher guides
3. 7 physics readers
4. Student lab guides
5. Lab & demonstration apparatus
6. Overhead transparencies
7. Film loops and filmstrips
8. Test booklets
9. Supplementary units
10. Programmed instruction booklets

K. MATERIALS AVAILABLE FREE: Newsletters free upon request to News Editor, Harvard Project Physics - see address in B.

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None yet, but eventually there will be translations.

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: Approximately 60.
b. Some specific schools where course is being taught: Solon High School, Solon, Ohio; Lowell High School, Whittier, Calif.; Oak Ridge High School, Oak Ridge, Tenn.

P. MATERIALS PRESENTLY BEING DEVELOPED: Revisions of all of the above, plus additional loops, labs, transparencies, etc.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Teachers selected as part of the evaluation program will be trained at a Project Physics-operated institute at Wellesley College during summer '67. There will also be one NSF institute designed to present Project Physics materials at Creighton University, Omaha, under the direction of Arnold Moore. Extensive plans are now being formulated for a series of summer in-service and other kinds of teacher education programs.

R. PROJECT EVALUATION:
a. Instruments used: Welch Science Process Inventory, Physics Achievement Test, Test on Understanding Science, Semantic Differential Science Interest Inventory (pre-post changes). Intelligence tests, group dimension question, personality measures, scale of values, student questionnaire.
b. Control groups: Yes. 1966-67, Non-equivalent comparison groups (9 schools). 1967-68, Twenty-five randomly selected control groups.
c. Feedback process: Weekly reports from 55 teachers. Sample data on specific materials from 10 teachers, e.g., text, teacher's guide, lab, demonstrations, etc.
d. Behavioral objectives identified: We have identified outcomes we think our course will affect and either developed or secured instruments which measure them. Our general goal is to show how effective our course is under specific school conditions.
e. Research evidence of objectives achieved: Unit tests, 1965-66 and 1966-67; student questionnaire, 1965-66.
f. Other pertinent information: Reports and papers describing the evaluation of the Project have been written by Wayne Welch and Herbert Walberg. These will appear in several journals and be presented at several conventions during 1967.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: See Project Newsletters and report.

T. **PLANS FOR THE FUTURE:** The Project hopes to bring to a completion most of those activities related to the design of instructional materials in physics by June 30, 1968. Beyond that time, conferences, dissemination, teacher education, and international activities will be the main focus of the Project.

A. PROJECT TITLE: HIGH SCHOOL GEOGRAPHY PROJECT OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS (HSGP)

B. PROJECT DIRECTOR: Dr. Nicholas Helburn, Sugarloaf, Star Route, Boulder, Colorado 80302. Tel: 303-442-3412.

C. PROJECT HEADQUARTERS:
   a. Address: High School Geography Project, P. O. Box 1095, Boulder, Colo. 80302. Tel: 303-443-2211, X 7881, 7882, 7883, 7884. Contact Dr. Nicholas Helburn at Project Headquarters.
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Nicholas Helburn, Director; George Vuicich, Associate Director; Richard Keppel, Assistant Director; Dana Kurfman, Evaluation Specialist; Anthony Petrillo, Education Specialist.

E. PROJECT SUPPORT:
   a. Organizational sponsorship: Association of American Geographers.
   b. Funding agency: National Science Foundation.

F. PROJECT HISTORY:
   a. Principal originators: Joint Committee of the National Council for Geographic Education, and the Association of American Geographers, Gilbert White and Clyde Kohn, co-chairmen.
   b. Date and place of initiation: 1961. First headquarters - San Fernando Valley State College, California.
   c. Reason for initiation: To evaluate the nature and objectives of geography taught in secondary schools; to develop materials suitable for secondary students stressing conceptual learning objectives and incorporating ideas current among professional geographers.

G. PRESENT COMMERCIAL AFFILIATIONS: None. Negotiations with publishers are in progress.

H. PURPOSES AND SPECIFIC OBJECTIVES: HSGP has as its goal the development of teaching materials that represent current geographic thought and research. Emphasis is on conceptual learning through an inductive approach rather than memorization of place names and facts. The Project is currently developing one course, based on a Settlement Theme. Writing and school trial activities are carried on at various centers. Another course, on a Regional Theme, is scheduled to be developed. Reference volumes for teacher use are being prepared as well.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Geography - designed for 9th or 10th grade.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1.	Unit I	Introduction
2.	Unit II	Inside the City
3.	Unit III	Network of Cities
4.	Unit IV	Manufacturing
5.	Unit IX	Political Geography

K. MATERIALS AVAILABLE FREE: Newsletters; Progress Reports; Annotated Bibliography; Limited numbers of the Advisory Paper. Available through the Project Office.

L. MATERIALS PURCHASABLE:

2. Unit II	Materials for class of 30 students	$71.00
	Inspection set - 1 set of student and teacher materials	56.50
	Printed matter only - 1 set	2.75

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 70 teachers in school trials.

b. Some specific schools where course is being taught: Taft Junior High School, San Diego, Calif.; George N. Tremper High School, Kenosha, Wis.

P. MATERIALS PRESENTLY BEING DEVELOPED:

6.	Unit V	Agriculture
7.	Unit VI	Culture Change
8.	Unit VII	Habitat
9.	Unit X	Japan
10.	Unit XI	Frontiers of Geography

11. Reference Series: a) Local Geography; b) Maps and Air Photos.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: NDEA Institute for Institute Directors, Teacher Trainers, and Supervisors to familiarize these persons with HSGP materials. University of Colorado - February 26-March 4, 1967; Rutgers University - March 19-25, 1967. Institute for School Trial Teachers - dates to be determined (late summer, 1967), Boulder, Colorado.

R. PROJECT EVALUATION:

a. Instruments used: Unit tests, given as pretests and post-tests, of knowledge, understanding and skills which average about 40 items each. Teacher and student evaluation questionnaires.

b. Control groups: Not as yet.

c. Feedback process: Test and questionnaire data are sent to Educational Testing Service for processing. Educational Testing Service reports to Project staff within 4-6 weeks after a unit is taught.

d. Behavioral objectives identified: Partially.

e. Research evidence of objectives achieved: Strictly speaking--none.

f. Other pertinent information: We are developing a backlog of information about pretest-post-test increments and teacher-student judgments so that we can set realistic performance expectations for our units, and activities within units. That is, we are getting a sense of what is a "good" pretest to post-test increment for a group of questions. Also, what a "good" degree of student interest or teacher judgment of effectiveness is.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Limited school trials of Units I, II, III, IV, IX; Development and preliminary trials of Units V, VI, X; Continuation of work on Reference Series and Book of Outlines; Institutes for: (1) Selected school trials teachers; (2) NDEA Institute directors, teacher trainers, and supervisors.

T. PLANS FOR THE FUTURE:
Book of Course Outlines - Spring, 1967
Reference Volume - Use of Maps and Aerial Photographs
Summer, 1967
Reference Volume - Local Geography, Fall, 1967
Begin development of a second course - Regional Geography
Increased efforts in teacher education.

A. PROJECT TITLE: ILLINOIS INSTITUTE OF TECHNOLOGY, SECONDARY SCHOOL COMPUTER SCIENCE EDUCATION, OPERATION COMPUTEL

B. PROJECT DIRECTORS: Charles R. Bauer and Anthony P. Peluso; IIT Computation Center, 3200 S. Wabash Ave., Chicago, Ill. 60616, Tel. 312-225-9600

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above. Contact: Dr. Peter G. Lykos, Director, Computation Center
b. Facilities available for viewing: Visitors welcome by previous arrangement.

D. PRINCIPAL PROFESSIONAL STAFF: Peter G. Lykos, Director; William S. Worley, Jr., Assistant Director for Systems; Charles R. Bauer, Director, Secondary School Computer Science Education;Anthony P. Peluso, Assistant Director, Secondary School Computer Science Education.

E. PROJECT SUPPORT:
a. Organizational sponsorships: IIT supplies computer time.
b. Funding agencies: None - fee structure - available brochure describes courses and fees.

F. PROJECT HISTORY:
a. Principal originator: Dr. Peter G. Lykos
b. Date and place of initiation: February 1963; Illinois Institute of Technology
c. Reason for initiation: Dissemination of computer information to Secondary School teachers and students.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The IIT Computation Center presents educators and other professional persons with an unusual opportunity by offering a short, intensive, non-credit course in computer science for school administrators, supervisors, college teachers, secondary school teachers and elementary school teachers.

Secondary School teachers teach computer programming to teachers and students on Saturdays using IIT Computation Center facilities. The program has affected 7,000 students and 700 teachers in the past four years.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Computer Programming Languages; IITRAN, FORTRAN, COBOL, STOP (an assembly language). See available brochure for detailed course descriptions. Grade levels - Sixth grade to University Professors.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Brochure
2. IITRAN/360 Self-Instruction Manual (soon to be published by Addison-Wesley)
3. Course outline (one semester)
4. Course outline (two semester)
5. Sample program
6. Reprint of School Board article and other articles
7. Cost sheet

K. MATERIALS AVAILABLE FREE: Items 1, 3, 4, 5, 6 and 7 from Project Headquarters

L. MATERIALS PURCHASABLE: Item 2 - IITRAN/360 Self-Instruction Manual and Text by C. R. Bauer, A. P. Peluso, and W. S. Worley. Purchase from IIT Bookstore, $4.10

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None at present.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 16 (in classroom situation) Several hundred (in teacher workshops)

b. Some specific schools where course is being taught: Lane Technical H. S., Chicago; South Shore H. S., Chicago; Brother Rice, Chicago; Gary, Indiana, all secondary schools (9); Oak Park-River Forest H. S.,; Downers Grove North; Highland High, Highland, Ind.; Munster, Munster, Inc.; Southeast Chicago City College; Larkin H.S., Elgin, Ill.

P. MATERIALS PRESENTLY BEING DEVELOPED: 8. FORTRAN Self-Instruction Manual

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Workshops are offered to introduce the teacher to computers, to introduce the IITRAN Language and to give experience with programming skills and problem-solving.

R. PROJECT EVALUATION:

a. Instruments used: Questionnaires given to students and teachers.

b. Control groups: None

c. Feedback process: Staff conferences on tabulated results of student and teacher responses.

d. Behavioral objectives identified: Yes, ability to write computer programs.

e. Research evidence of objectives achieved: Successful computer programs written by students. Student Science Fair participation with computer science projects, etc.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not preciously reported

T. PLANS FOR THE FUTURE: None described

A. PROJECT TITLE: INDIVIDUALLY PRESCRIBED MATHEMATICS INSTRUCTION (IPI MATH)

B. PROJECT DIRECTOR: Dr. John Bolvin, Learning Research & Development Center, 160 N. Craig St., University of Pittsburgh, Pittsburgh, Penn. 15213 Tel: 412-683-8640.

C. PROJECT HEADQUARTERS:

a. Address: 160 N. Craig St., University of Pittsburgh, Pittsburgh, Penn. 15213 Tel: 412-683-8640. Contact Dr. Joseph Lipson.

b. Facilities available for viewing: The project being conducted at Oakleaf School may be visited if adequate advance notice and alternate dates are given.

D. PRINCIPAL PROFESSIONAL STAFF: Joseph Lipson, Curriculum Director; Edith Kohut, Editor, Supervisor; Barbara Thomas, Mildred Sucov, Ethel Kolodner, Lesson Writers; John Bolvin, IPI Director.

E. PROJECT SUPPORT:

a. Organizational sponsorships: Learning Research & Development Center, Research for Better Schools, and Baldwin Whitehall School District.

b. Funding agency: United States Office of Education.

F. PROJECT HISTORY:

a. Principal originators: Robert Glaser; Joseph Lipson; W. Shepler; J. Williams.

b. Date and place of initiation: September, 1964, Baldwin Whitehall School District, Oakleaf Elementary School.

c. Reason for initiation: To allow each child's work to be evaluated daily and, if necessary, to permit a unique work assignment to be made daily for each child so that the child has mastered all past work as he faces a new learning task. The focus of the Center is individualization of instruction.

G. PRESENT COMMERCIAL AFFILIATIONS: Appleton-Century-Crofts is working on a trial commercial version of the materials.

H. PURPOSES AND SPECIFIC OBJECTIVES: Curriculum is defined by a set of 400 performance objectives for K-6; diagnostic placement, pre and post, and curriculum embedded tests are used to assure mastery and to identify what the study sequence should be; materials and information are organized so that each child can be working on a different objective and with a unique sequence of materials.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics - K-6 all areas.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. About 3000 worksheets.
2. About 60 recorded phonograph disc lessons.
3. Manual.
4. Individualized Instruction in Elementary Mathematics.
5. Development of an Elementary School Mathematics Curriculum

for Individualized Instruction with Robert Glaser and Henry Cohen.

6. Mathematics Curriculum.
7. Rationale and Philosophy of Oakleaf Mathematics Curriculum.
8. Transfer and Generalization in Individually Prescribed Instruction.
9. Lipson's New Math Curriculum.

K. MATERIALS AVAILABLE FREE: None described

L. MATERIALS PURCHASABLE: The complete set of worksheets costs about one cent per page and more than $70 worth of clerical time to assemble. These can be supplied for about $100 if Dr. Bolvin has been contacted and approves the use which will be made of the set.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 120

b. Some specific schools where course is being taught: Oakleaf Elementary School, McAnnulty Elementary School, Pittsburgh, Penn.; Downey Elementary, Harrisburg, Penn.; Richmond Elementary, Quakertown, Penn.; Foothill Elementary School, Monterey, Calif.; Boulder Creek Elementary, San Lorenzo Valley, Calif.; David Avenue Elementary, Pacific Grove, Calif.; Brentwood Elementary, Elk Grove, Ill.; West Elementary, Dover, Del.; Washington Elementary, Trenton, N. J.

P. MATERIALS PRESENTLY BEING DEVELOPED:

10. Book on IPI
11. Lessons using concrete materials
12. Vocabulary units for curriculum
13. Audio and audio-paced lessons
14. Seminar

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Four-week workshop will be held at University of Pittsburgh, but details are not yet fixed. Content will include lectures and seminars on the theory of individualized instruction as well as practical experience in summer schools using IPI procedure.

R. PROJECT EVALUATION:

a. Instruments used: Standardized Achievement, Attitude Scale Tests, Teacher and student interviews, analysis of rate and lesson variation.

b. Control groups: No

c. Feedback process: Weekly feedback of student progress and test scores; yearly feedback of special evaluation surveys.

d. Behavioral objectives identified: Yes

e. Research evidence of objectives achieved: Very extensive test, re-test, and retention data.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not previously reported.

T. **PLANS FOR THE FUTURE:** Dissemination to interested, qualified schools willing to be part of the development program - 1967-1970; Publication of materials in commercial form - 1968; Extension of IPI to junior high school - 1968.

A. PROJECT TITLE: INTERMEDIATE SCIENCE CURRICULUM STUDY (ISCS)

B. PROJECT DIRECTOR: Ernest Burkman, Professor of Science Education and Director, Intermediate Science Curriculum Study, Kellum Hall Basement, Florida State University, Tallahassee, Fla. 32306 Tel: 904-599-3164.

C. PROJECT HEADQUARTERS:
  a. Address: Same as B. Contact Project Director.
  b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: David Redfield; Stewart Darrow; John Bonar; William Snyder; Ardley McDonald.

E. PROJECT SUPPORT: United States Office of Education.

F. PROJECT HISTORY:
  a. Principal originator: Ernest Burkman.
  b. Date and place of initiation: June 1966 (Pilot Study begun June 1964), Florida State University.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop a comprehensive science program for grades 7-9. Student materials are being written in "self pacing" style. The students work through them at their own rate. "Package" will contain materials designed for all students and "excursions" (supplemented materials), whereby the teacher can accommodate both better than average and below average students. The project is using computer assisted instruction as a vehicle for evaluation. Sequence features gradual building of process skills and sequential development of basic notions. Transition is from tight structure in grade 7 to open-ended activities in grade 9.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Grades 7, 8 and 9.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
  1. 7th grade student materials - Volume I.
  2. 7th grade student materials - Volume II.
  3. Teacher's manual for Volume I (7th grade).
  4. Teacher's manual for Volume II (7th grade).
  5. Excursions for grade 7.

K. MATERIALS AVAILABLE FREE: Project Newsletter (see C).

L. MATERIALS PURCHASABLE: None as yet.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None as yet.

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: 50
  b. Some specific schools where course is being taught: Test centers in Iowa City, Iowa; Glen Ellyn, Ill.; Indianapolis, Ind.; Keene, N. H., and Sarasota, Fla.

P. MATERIALS PRESENTLY BEING DEVELOPED:

6. First draft of Grade 8 materials will be written during the summer of 1967.
7. Grade 7 materials will be revised during 1967.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Preliminary conference planned in August for 1967-68 tryout teachers - site to be determined.

R. PROJECT EVALUATION:

a. Instruments used: Tests on Understanding Science; California Tests of Mental Maturity; Metropolitan Science and Math; Locally developed achievement tests.
b. Control groups: Yes
c. Feedback process: Written comments by teachers; observation by Center leaders and project staff; computer assisted instructed version of course being tested simultaneously; student responses to each step of curricular materials being collected and analyzed.
d. Behavioral objectives identified: No
e. Research evidence of objectives achieved: None yet

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Project greatly expanded from pilot study reported last year. U.S.O.E. funding has permitted a major effort.

T. PLANS FOR THE FUTURE: Summer 1967 - revise 7, develop 8; summer 1968 - revise 7, revise 8, develop 9; summer 1969 - revise 7, revise 8, revise 9; 1970-71 - finalize revisions, develop A-V aids, etc. Tentative phase-out date - August 1971.

A. PROJECT TITLE: INTRODUCTORY PHYSICAL SCIENCE (IPS)

B. PROJECT DIRECTOR: Uri Haber-Schaim, Introductory Physical Science Program, Educational Services Incorporated, 55 Chapel Street, Newton, Mass. 02160; Tel: 617-969-7100.

C. PROJECT HEADQUARTERS:
- a. Address: Introductory Physical Science Program, Educational Services Incorporated, 55 Chapel Street, Newton, Mass. 02160; Tel: 617-969-7100.
- b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: A number of people have worked on the project at different times. The preface to the textbook gives acknowledgments.

E. PROJECT SUPPORT:
- a. Organizational sponsorship: Educational Services Incorporated
- b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
- a. Principal originators: The preface to the textbook gives acknowledgments.
- b. Date and place of initiation: 1963, Educational Services Incorporated, 164 Main Street, Watertown, Mass.
- c. Reason for initiation: To develop basic attitudes and skills with regard to science and to offer students insight into the means by which scientific knowledge is acquired, as well as offering students a beginning knowledge of physical science.

G. PRESENT COMMERCIAL AFFILIATIONS: Prentice-Hall, Inc., Englewood Cliffs, N. J.; Macalaster Scientific Corporation, 60 Arsenal Street, Watertown, Mass.; Modern Learning Aids, 1212 Avenue of the Americas, New York, N. Y.

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop a one-year course in physical science for use in junior high schools. The student laboratory work is of primary importance. To emphasize this the laboratory instructions are incorporated in the body of the text; the results are not described. The equipment has been designed in such a way that the students can perform the experiments in ordinary classrooms.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: The major emphasis in the course is on the study of matter. The course has been extensively used in grades 8 and 9 with students who have a wide range of abilities. In addition, many schools have used the course in grades 11 and 12 for students who do not plan to take physics or chemistry.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Text: Chapters 1-11.
2. Teacher's Guide: corresponds to Chapters 1-11 of text.
3. Laboratory equipment and apparatus.
4. Achievement tests: correspond to chapters 1-3, 4-6, and 10-11.
5. Film: "Mass of Atoms".

K. MATERIALS AVAILABLE FREE: Brochure describing the course is available from Project Headquarters - See C.

L. MATERIALS PURCHASABLE:

1. $2.64 (clothbound) or $1.89 (paperbound); Prentice-Hall, Inc., Educational Book Division, Englewood Cliffs, N. J. 07632.
2. $4.47; Prentice-Hall, Inc. (address as above).
3. Prices vary; Prentice-Hall, Inc. (address as above), AND Macalaster Scientific Corp., 60 Arsenal St., Watertown, Mass.02172
4. $9.00/package; Prentice-Hall, Inc. (address as above).
5. Modern Learning Aids, 1212 Avenue of the Americas, New York, N. Y. 10036.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None at this time.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Approximately 1500.
b. Some specific schools where course is being taught: Pilot courses are being taught in twenty states. A list of specific schools and pilot teachers is available.

P. MATERIALS PRESENTLY BEING DEVELOPED:

6. Additional laboratory tests.
7. Additional achievement tests.
8. College edition and Resource book.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The Project strongly encourages school districts or cooperating groups of school districts to establish local workshops. The most successful arrangement for a workshop consists of 5 full days just before school and the equivalent of 10 full days following during the school year. The Project will assist schools in locating an experienced and qualified workshop instructor. Ten NSF Summer Institutes are to be held in the summer of 1967; one of these is co-sponsored by ESI and Wellesley College and is designed specifically for science supervisors and master teachers who will conduct local workshops. In such workshops and institutes teachers do the experiments, pool their results with others to reach a conclusion, work homework problems and defend their answers, and in general follow the development of the course in much the same way as their students will.

R. PROJECT EVALUATION:

a. Instruments used: Achievement tests and feedback.
b. Control groups: None
c. Feedback process: During the last three years the pilot teachers (about 55 each year) have submitted regular written comments on all aspects of the course, such as text, teacher's guide, experiments, equipment, and quizzes. These reports have been carefully reviewed and used as the basis for the revisions of the text and teacher's guide.

d. Behavioral objectives identified: No specific ones which can be enumerated here.

e. Research evidence of objectives achieved: Observations of pilot teachers, results of achievement tests, results of laboratory tests.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Revision of the text and teacher's guide for the regular commercial edition has taken place. Work is in progress on a second battery of achievement tests as well as additional laboratory tests. A college edition and resource book is being prepared and piloted on a limited basis. Feedback is being received and reviewed on this college edition/resource book.

T. PLANS FOR THE FUTURE: Final work on the college/resource book is to take place, as well as completion of the new achievement tests and laboratory tests. The project will then phase out.

A. PROJECT TITLE: IOWA SCIENCE AND CULTURE PROJECT

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: Robert E. Yager and J. Doyle Casteel. March 1966

C. PROJECT DIRECTOR: Robert E. Yager

D. PROJECT HEADQUARTERS ADDRESS: Science Education Center, University of Iowa, Iowa City, Iowa 52240

E. PROFESSIONAL STAFF: Robert E. Yager, Director; George W. Cossman, Robert M. Fitch, J. Doyle Casteel, Barbara S. Thomas, John H. Haefner, Harold B. Engen, Paul W. Tweeten, Principal Staff; twelve special consultants are also involved with the preparation and evaluation of student materials.

F. PROJECT SUPPORT:

a. Organizational sponsorships: University of Iowa; Iowa Academy of Science; Iowa State Department of Education

b. Funding agencies: Iowa Testing Progra; U. S. Office of Education; Upper Midwest Regional Laboratory

G. SPECIFIC PURPOSES AND OBJECTIVES: The educational objective of science courses in the general education program of the secondary school is the creation of understandings of science, its technology, its methodology, its practitioneers, and its philosophy. The primary aim of the social studies is the development of those understandings, skills, and attitudinal orientations which will enable students, as future citizens of a liberal and scientific society, to come to terms with social realities. For both the primary purpose in modern society then is preparing students to live and react alertly in a civilization whose future must be sought within the spirit of Western commitment to science and its philosophy. Alert citizenship, now more than ever, demands an awareness of how science affects culture and of how culture affects science. Yet neither science education nor social education working in isolation has achieved its goals. To structure a course utilizing the bi-disciplinary approach and evaluate its effectiveness is the objective of this project.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: A general education course entitled "Science and Culture" for eleventh and twelfth year students.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: The course has been outlined and specific textual as well as supplementary materials to support the course have been prepared. This material which has been structured for the course has been taught for the first time at the Laboratory School at the University of Iowa. It is characterized as follows.

The first unit involves an orientation to the study of ideas, the issues involved in the experimental program, and some practice in the use of historical perspectives when studying ideas. The sources for this unit involve the use of materials intended for upper level college undergraduates--and in some instances even more competent people. The names Whitehead and Dilthey mean a great deal to people aware of their philosophical writings.

The second unit focuses on the study of science and politics as philosophies. Set in the classical world of antiquity this involves a chronological history of science in the pre-Socratic period; a chronological history of the polis in thought in the pre-Socratic period; an analysis of the quarrel between Sophists and Socratics as a battle between philosophies; an analysis of the significance of the social thought of Plato as opposed to that of Epicurus for the Greek and for the present; and a generalization of this quarrel through a comparison of the Roman philosophers Lucretius and Cicero, as an explanation for the relative significance of Hellenistic science. The unit concludes with an examination of Aristotelian biology and a comparison of his methodology in science as compared to that he chose to impose on his study of politics.

The third unit concentrates on the scientific revolution of the sixteenth and seventeenth centuries. First students study the Ptolemaic system observing that medieval science was rational. Secondly, the theory of impetus and the "Metron Board" illustrate that medieval science made advances. The third theme discusses the conservatism of Copernicus, Vesalius, and Harvey. Next, the diversity of characters involved is demonstrated through a study of the motivations of Kepler and Galileo. How science first found and then became a reductionist philosophy involves a comparison and contrast of Bacon and DesCartes. The nature of the scientific enterprise is shown by a study of the sources of Newton's ideas. The genius of Newton is granted to his creative ordering and arrangement of ideas.

The social considerations of this thought have three dimensions: (1) That the scientific revolution occurred contemporaneously with the Renaissance and Reformation is far from accidental; times of change, including its methodology, makes changes in scientific concepts easier; (2) The effort to reduce explanations to general laws influenced the social thought of men like Hobbes and Locke; (3) The American nation was formed amid the assumptions of this reductionism which can be observed in both the Declaration of Independence and the Federalists Papers. Observe that whereas the first unit concentrates on philosophy, the second unit is directed toward an understanding of science and culture in interaction when they seek operational syntheses for inquiring about the world of nature and about the world of man.

Unit four, Darwinism in biology and social thought, concentrates more directly on the development of industrial America in the second half of the nineteenth century. The first theme is the source of Darwin's ideas to reinforce the creative and empirical aspects of science. The second goal is a grasp of Darwin's Biological theory. Next Spencer's motivations and ideas are examined. This leads to an examination of the popular acceptance of a popularized Darwinism in America. The role of a popular social theory, founded on popularized scientism, follows.

When these objectives have been met, students will review what Darwin said and compare this to how he was popularized. In fact, they should readily see that his science as social theory was a myth. The unit culminates with a study of Ward, James, and Dewey, all reform Darwinists. The unit thus closes suggesting that the strength of myth in science is worthy of investigation.

The final unit picks up the theme of science as science and science as myth and indicates the ways in which this constitutes a danger both to science and to society. Freud and psychoanalysis, positivism and its consequence in human consciousness of subjectivity, Einstein and relativity, and finally the theory of probabilities are directional possibilities. In each instance a scientific theory is studied in three ways: (1) As a scientific idea; (2) as popularized; and (3) as a societal force. The limitations of science as a social philosophy, rather than any specific content, are explored. The final conclusion should be that behind science, as behind any other institution invented by man, stands the human mind.

J. USE OF PROJECT MATERIALS: The materials are being used in an experimental class at the Laboratory School of the University of Iowa during the 1966-67 school year. Parts of units were incorporated into other courses in the school's curriculum during the preceding two years.

Initial results of the research phases are so extremely encouraging that plans call for the establishment of several trial centers in Iowa for use of the course materials for the 1967-68 school year.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None other than English

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED:

1. A teacher's guide to accompany textual materials
2. A revised and completed textbook set
3. Testing materials
4. Audio-visual materials

N. MATERIALS AVAILABLE FREE: None

O. MATERIALS PURCHASABLE: None, as yet.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: An extensive pre- and post-testing program is underway with the class now experiencing the course. An expanded program of evaluation is planned for 1967-68 as other teachers and schools become involved with the subject.

R. PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

S. PLANS FOR THE FUTURE: An enlarged writing conference is planned for later in 1967. Continued evaluation of students and feedback reports from teachers are planned for the 1967-68 year. These data will probably result in further refinement and development.

A. PROJECT TITLE: K-12 SCIENCE DESIGN

B. PROJECT DIRECTOR: Mr. J. Paul Taylor, Elementary Curriculum Coordinator, Las Cruces School District No. 2, 301 West Amador Ave., Las Cruces, N. Mex. 88001. Tel: 524-2894.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B. Contact Project Director.
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: None described.

E. PROJECT SUPPORT: Las Cruces School District No. 2.

F. PROJECT HISTORY:
   a. Principal originator: Las Cruces School District No. 2.
   b. Date and place of initiation: September, 1961; Las Cruces Schools.
   c. Reason for initiation: To establish an articulated program in science, grades 1-12.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To study curricula in science and develop a design which would meet our school district's needs.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Science, grades 1-12.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Resource Units for First Grade Science: What Can You Do for Good Health? The Earth on Which We Live; What Is Our Earth Like? What Makes Toys Work? Why Are Plants Important To Us? What Is a Farm? The Zoo.
   2. Resource Units for Second Grade Science: Animal Unit; Our Five Major Senses; Material and Energies of the Earth; The Universe.
   3. Resource Units for Third Grade Science: The Earth in the Solar System; Weather; Sound; Light.
   4. Resource Units for Fourth Grade Science: Mother Earth's Diary, Let's Find Her Secrets; Plants; Animals; Desert Plants and Animals; The Human Machine.
   5. Resource Units for Fifth Grade Science: Matter From State To State; Conservation of Soil, Water, and Air; Our Bodies--Chemical Factories; or The Chemistry of Nutrition.
   6. Resource Units for Sixth Grade Science: Magnetism and Electricity; How Does Man Use Light and Sound in the World of Communication? The Everyday Atom; Stairway to the Stars; Air Physics.
   7. Resource Units for Seventh Grade Biology: All Matter is Made of Elements; Living Things are Dependent Upon Their Environment; There Are Many Kinds of Living Things; Living Things Perform Certain Functions in Order to Live.
   8. Resource Units for Eighth Grade Chemistry and Earth Science: Matter Matters; The Earth in the Universe.
   9. Resource Units for Ninth Grade Physics: Matter, Motion and Force; Waves and Electrons.

K. MATERIALS AVAILABLE FREE: None listed.

L. MATERIALS PURCHASABLE: Single copies - $1.00 each. Complete set, Grades 1-9 - $5.00.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None, other than English.

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: 325
  b. Some specific schools where course is being taught: All elementary and junior high schools in Las Cruces School District No. 2.

P. MATERIALS PRESENTLY BEING DEVELOPED: A continuing study of curriculum content in science in grades 10, 11, and 12 is being made.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: An in-service meeting introducing materials and a plan for their use was held at the opening of the 1965-66 school year. This was followed by in-service meetings within individual building units. A plan for the use of the materials is described in the foreword of each guide.

R. PROJECT EVALUATION: Teachers will use the materials for three years, making revision notes as the resource units are used. Teachers' comments will be weighed and total program evaluated at the end of three years' use (at the end of the 1967-68 school year). After pertinent revisions are made, the materials will then be used and re-evaluated at regular intervals.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not described.

T. PLANS FOR THE FUTURE: It is hoped that during the summer of 1968 teachers who wrote the science design can be brought together to update materials. In the meantime, suggestions for improving the guides will be received and considered prior to the writing session.

A. PROJECT TITLE: THE MADISON PROJECT OF SYRACUSE UNIVERSITY AND WEBSTER COLLEGE

B. PROJECT DIRECTOR: Professor Robert B. Davis, 8356 Big Bend Blvd., St. Louis, Mo. 63119, Tel: 314-WO 2-0440 or WO 2-9040

C. PROJECT HEADQUARTERS:
a. Address: Same as "B". Contact: Inquiry Department, The Madison Project
b. Facilities available for viewing: By special arrangement it is possible to visit classrooms in various schools, including culturally deprived situations, non-graded schools, schools using various forms of flexible programming and team teaching, etc. In addition, it is possible to view Project films (which also show actual classroom lessons), and to talk with Project personnel about special problems of various sorts. Some Project classrooms center around "mathematics laboratories".

D. PRINCIPAL PROFESSIONAL STAFF: Senior research associates and senior demonstration teachers: Beryl S. Cochran, Frank Van Atta, Donald Cohen, Katharine Kharas, Katherine Vaughn, Katie Reynolds, Ogie Wilkerson, Gordon Clem, Doris Machtinger, Irene Travis, Gerald Glynn, Elizabeth Herbert, Anita Tannuzzo, John Gessel, Donna Doyle, William Fitzgerald, Irvin Vance; Administrative Assistants: Martha Bowen, Martha Rollins; In Charge of Films and Videotapes: Louise Daffron; In Charge of Manuscript Production: Bernice Talamante; Coordinators for Syracuse University: Donald E. Kibbey, Chairman, Mathematics Department; Dean David Krathwohl, College of Education; Coordinator for Webster College: Jacqueline Grennan, President, Webster College

E. PROJECT SUPPORT:
a. Organizational sponsorships: Syracuse University, Webster College, and a group of participating school systems.
b. Funding agencies: National Science Foundation and the United States Office of Education, with some participation of Ford Foundation Funds. Originally supported also by the Marcel Holzer Foundation, The Alfred P. Sloan Foundation and a group of industries and trade unions in the St. Louis area, as well as by contributions from participating schools and colleges.

F. PROJECT HISTORY:
a. Principal originators: Robert B. Davis, Donald E. Kibbey, Beryl S. Cochran and the faculties of Syracuse University and Webster College
b. Date and place of initiation: 1957, Syracuse, N.Y. and Weston, Conn.
c. Reason for initiation: The Madison Project was created in part in order to revitalize the teacher education program in mathematics at Syracuse University, particularly with reference to achieving a closer relation between the studies of prospective teachers and the operational problems of high quality schools. (This included schools in culturally deprived areas where the school program itself was in some measure exemplary.) There was also

a second reason for the creation of the Project, namely the conviction that even the best schools were doing a good deal less than the best possible job of introducing children to mathematics, to science, and to other areas of our culture (as well as doing less than an optimal job in promoting the students self understanding and growth toward maturity).

G. PRESENT COMMERCIAL AFFILIATIONS: Four volumes of material are available from Addison-Wesley Publishers, Namely: Discovery In Mathematics, Student Discussion Guide; Discovery In Mathematics, A Text For Teachers; Explorations in Mathematics, Student Discussion Guide; Explorations in Mathematics, A Text for Teachers.

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop, disseminate and implement a supplementary program in mathematics for nursery school through grade 12. Special attention is given to the kind of creative learning experience which children can have in school and outside of school. This involves extensive consideration of the social organization of the classroom and of similar matters. In general, the "point of intervention" for the Madison Project is either at the point of actual classroom experience of the child, or else at the point of instructional planning on the part of the teachers. It is not at the point of designing textbooks or producing textbooks.

Because of the emphasis on actual classroom experiences, the Project makes a very large number of videotapes and films that show actual classroom lessons. At the present time, these films, or excerpts from them, are available in many different forms for study by teachers or by prospective teachers. Detailed analysis of these films is now being undertaken by Gerald B. Glynn and Louise A. Daffron.

In addition, the Project for the last two years has put special emphasis upon "mathematics laboratories" and the use of physical materials; in doing this, it has often joined forces with the Elementary School Science (ESS) Project of ESI, and with the Nuffield Mathematics Project in England.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: The Madison Project is, of course, concerned both with materials and with methods; its work might, consequently, be described as dealing both with curriculum and with instruction. The present summary of mathematical content should not, therefore, obscure the fact that the Project's activities have dealt with equal emphasis in both the curriculum area and the instruction area.

The Project's mathematical content divides into two portions: the first part deals with mathematical content which is relatively novel at the grade levels in question. This includes mainly coordinate geometry, an axiomatic approach to algebra, some mathematical logic, the theory of limits, and applications to physical science. A second (and more recent) part of Project materials deals with topics which are relatively familiar at the grade levels in question, where the Project is concerned mainly with improving the child's opportunities to learn the basic ideas.

This latter portion deals, necessarily, mainly with fundamental ideas of arithmetic (such as, place value numerals, the concept of division, etc.).

Grade levels range from nursery school through college.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. *Discovery In Mathematics*. (Publishers, Addison-Wesley Publishing Co., Inc.) Student discussion guide, plus text for teachers. This book provides a supplementary program in coordinate geometry, axiomatic algebra, and applications to science, suitable especially for grades 4 - 8. It is concerned particularly with creative learning experiences of a non-routine nature.
2. *Explorations In Mathematics*. Student discussion guide, plus text for teachers. This book is concerned with introductory ideas in algebra, statistics, mathematical logic, matrix algebra, and some applications to physics. Special emphasis is placed upon historical background, and the study of this book can be closely related to various units in social studies (such as the life and times of Rene Decartes). It is suitable for grades 6 through 9, inclusive.
3. *A Modern Mathematics Program as it Pertains to the Interrelationship of Mathematical Content, Teaching Methods, and Classroom Atmosphere. (The Madison Project). 1963*. Report submitted to the Commissioner of Education, U. S. Office of Education, fall, 1963. This provides a general view of Madison Project activities.
4. *A Modern Mathematics Program as it Pertains to the Interrelationship of Mathematical Content, Teaching Methods, and Classroom Atmosphere. (The Madison Project). 1965*. Report submitted to the Commissioner of Education, U. S. Office of Education, fall, 1965. Note that this is distinguishable from item #3 above only by the date. The 1965 report is the most comprehensive description presently available of Madison Project materials and activities.
5. *The Madison Project - A Brief Introduction to Materials and Activities*. (1965)
6. *Notes on the Film: First Lesson*. (This pamphlet accompanies the film of the same name.)
7. Robert B. Davis, *Some Remarks on "Learning By Discovery"*
8. Robert B. Davis, *The Next Few Years*
9. Robert B. Davis, *Experimental Course Report/Grade Nine*
10. Doris Machtinger, *Experimental Course Report/Kindergarten*
11. *Supplementary Modern Mathematics for Grades 1 through 9. In-Service Course #1 for Teachers*. This is a complete "packaged" in-service course, including films, written materials, and laboratory equipment.
12. *Supplementary Modern Mathematics for Grades 2 through 9. In-Service Course #2 for Teachers*. This is a sequel to #11 above.
13. Audio tape recording #D-1: $\square + \square = 2 \times \square$. This is a recording of an actual classroom lesson with fifth grade children, proving algebraic theorems from a set of axioms selected by themselves.
14. Film (16mm., sound, black and white) *A Lesson with Second Graders*. This film shows an actual classroom lesson involving

signed numbers, the number line, and Cartesian co-ordinates. Viewing this film is one of the best introductions to Project activities.

15. Film (16mm., sound, black and white) Complex Numbers via Matrices. This film shows an actual classroom lesson. Seventh-grade students use the isomorphism between rational numbers and a subset of the set of 2-by-2 matrices to facilitate an extension into complex numbers.
16. Film (16mm., sound, black and white) Matrices. An actual classroom lesson. Fifth and sixth graders explore the algebra of 2-by-2 matrices.
17. Film (16mm., sound, black and white) Solving Equations with Matrices. An actual classroom lesson, similar to #15 above, but less sophisticated. Sixth-grade students.
18. Film (16mm., sound, black and white) Average and Variance. An actual classroom lesson, with 6th grade children.
19. Film (16mm., sound, black and white) Graphing an Ellipse. An actual classroom lesson, with 7th grade students.
20. Film (16mm., sound, black and white) Circles and Parabolas. An actual classroom lesson, with 6th grade children.
21. Film (16mm., sound, black and white) First Lesson. An actual classroom lesson, with a mixed class of children from grades 3 through 7.
22. Film (16mm., sound, black and white) Second Lesson. This lesson occurred on the day following that shown in #21 above, with the same students.
23. Film (16mm., sound, black and white) Weights and Springs. A "laboratory" lesson, with 6th grade children.
24. Film (16mm., sound, black and white) Graphing a Parabola. This is a portion of the film listed above as #20.
25. Film (16mm., sound, black and white) Guessing Functions. A seventh grade class of culturally deprived urban children.
26. "Shoebox" packages for physical experiments related to the mathematics program, or for physical and tactile experiences related to the learning of mathematics. (The Project also makes use of physical materials prepared by Z. P. Dienes, by ESS, by Nuffield Project, and by others, as well as desk calculators of various sorts.)

K. MATERIALS AVAILABLE FREE: The Madison Project, 8356 Big Bend Blvd., St. Louis, Mo. 63119.

5. Brief Introduction
7. Learning By Discovery
8. The Next Few Years

L. MATERIALS PURCHASABLE: Addison-Wesley Publishing Co., Inc., Reading, Mass.

1.	Discovery In Mathematics - Student Discussion Guide	$2.48
1.	Discovery In Mathematics - A Text For Teachers	8.00
2.	Explorations In Mathematics - Student Discussion Guide	2.68
2.	Explorations In Mathematics - A Text For Teachers (price to be announced)	

MATERIALS PURCHASABLE: The Madison Project, 8356 Big Bend Blvd., St. Louis, Mo. 63119

9.	Experimental Course Report/Grade Nine	$1.50
10.	Experimental Course Report/Kindergarten	1.50

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None planned at present.

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: Very large, but unknown
b. Some specific schools where course is being taught: Weston, Connecticut Elementary School; St. Thomas Choir School, New York City; Attucks Branch, St. Louis Public Schools; Columbia School, St. Louis Public Schools; Bruce Elementary School, Model School District, Wash., D.C.; Montgomery Elementary School, Model School District, Wash., D.C.; Bancroft School, Model School District, Wash., D.C.; plus some schools in England.

P. MATERIALS PRESENTLY BEING DEVELOPED: Gerald B. Glynn and Louise A. Daffron; 27. The Analysis of Classroom Behavior: 'The Weights and Springs' Lesson. (In preparation). This combines written materials and films, and is intended for use by teachers or prospective teachers, for example in connection with a methods course or a course in 'modern mathematics'.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: An undergraduate major which emphasizes Madison Project materials and methods is available at Webster College, Webster Groves, Mo. (for information write to: Professor Richard F. Singer, Webster College.)

A Master of Arts in Teaching program which emphasizes Madison Project materials is in operation at Webster College. (For information write to Professor Katharine Kharas, Webster College.)

Summer study involving Madison Project materials is available at Syracuse University (For information write to Professor Robert M. Exner, Mathematics Department, Syracuse University, Syracuse, N.Y.

A special workshop program operates in San Diego County, Los Angeles, Chicago, New York City, and Philadelphia. (For information write to: The Madison Project, 8356 Big Bend Blvd., Webster Groves, Mo. 63119)

Various special workshops--usually of about one week duration--operate in various parts of the United States at different times--for example, in the Kansas City, Mo. area, and in Miami, Fla., and in Corpus Christi, Tex.

R. PROJECT EVALUATION:
a. Instruments used: Please refer to Project literature.
b. Control groups: No; these would not be appropriate. There is no sensible way in which this material could be compared with any specific alternatives. (One might think of this more accurately in terms of a paradigm such as: a harp teacher moves to town, and now some children take lessons in harp playing. No particular comparison is reasonable in such a context.)

c. Feedback process: This operates on a very rapid basis, using small units of time; developmental work takes place right in the classroom. (Compare, for example, Harry Levin, "Reading Research: What, Why and for Whom?", Elementary English, February 1966, pp. 138-147.) For details, refer to Project literature.

d. Behavioral objectives identified: The Project has in part given explicit recognition to some behavioral objectives: Project experience has convinced us that the concept of 'evaluation' as it is normally used in education, is exceedingly misleading and is rarely actually appropriate. The Project is interested in 'describing ' its activities, and in some instances in rather minute investigations of its paradigmatic assumptions; and "evaluation" of Project materials must necessarily be subjective, because the questions at stake are indeed matters of values.

e. Research evidence of objectives achieved: The Project has followed the same children for as long as five or six years, recording their behavior on motion picture film. Thus it is possible to watch how these students attack new and unfamiliar problems, and how successfully they cooperate with one another when this is a group or committee venture. Teacher behavior is recorded as well as student behavior.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The main new emphasis in Project activities lies in five directions:

1. Increased use of physical materials in the mathematics classroom
2. Increased attention to individualization of instruction
3. Increased collaboration with other Projects, particularly ESS and the Nuffield Foundation Project
4. Operation of large scale workshops for teachers in major urban areas (such as Chicago, New York, and Los Angeles)
5. Development of special "analysis of classroom behavior" films by Louise Daffron and Gerald Glynn.

T. PLANS FOR THE FUTURE: The Project is particularly interested in contacting college teachers who may wish to use the Glynn-Daffron film in methods courses or in "modern mathematics" courses for teachers, or for prospective teachers.

A. PROJECT TITLE: MATHEMATICS LABORATORY PROJECT FOR LOW ACHIEVERS

B. PROJECT DIRECTOR: A. Wilson Goodwin, 1800 Grand Ave., Des Moines, Iowa 50307. Tel: 515-284-7735.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B. Contact Project Director.
   b. Facilities available for viewing: Math laboratories.

D. PRINCIPAL PROFESSIONAL STAFF: Director - as in "B" above; classroom teachers.

E. PROJECT SUPPORT: ESEA - Title I, U. S. Office of Education.

F. PROJECT HISTORY:
   a. Principal originators: Eldert Groenendyk, State Department of Public Instruction; Wilson Goodwin, Des Moines Public Schools.
   b. Date and place of initiation: 1965-66 school year. Experimental work in 1964-65. Public Schools, Des Moines, Iowa.
   c. Reason for initiation: Improve the general math program, 9th grade particularly, for low achievers.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To give the teachers tools with which to attack the problems of interest and aptitude; to develop supplementary curriculum materials and procedures to use with these students.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: General Math, 9th grade and above.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. LAMP Booklet of supplementary materials for teachers.
   2. Short brochure describing project.

K. MATERIALS AVAILABLE FREE: No. 2 - from Project Director.

L. MATERIALS PURCHASABLE: No. 1 - $2.00 per copy of 126 pages. From Project Director.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
   a. Number of teachers using materials: 8 in our system.
   b. Some specific schools where course is being taught: High schools: East High, North High, Dowling High. Junior High schools: Callaman, Hiatt, Irving, Weeks, and Wilson.

P. MATERIALS PRESENTLY BEING DEVELOPED:
   3. Enrichment and Appreciation of Mathematics for Teachers, 7-12.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Local inservice programs only.

R. PROJECT EVALUATION:

a. Instruments used: California Tests of Achievement - Pre and Post; Subjective evaluations by counselors, teachers, students and administrators.

b. Control groups: None

c. Feedback process: See "e".

d. Behavioral objectives identified: Improvement in attitudes toward math--and school in general; Improvement in math skills and concepts.

e. Research evidence of objectives achieved: Reports from school personnel. Varied test results in math skills.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not reported.

T. PLANS FOR THE FUTURE: To add additional material to the LAMP supplement. We have applied for an ESEA - Title III grant covering a 10-county area to develop math materials for the low achievers, grades 7-9.

A. PROJECT TITLE: MICHIGAN SCIENCE CURRICULUM COMMITTEE JUNIOR HIGH SCHOOL PROJECT (MSCC-JHSP)

B. PROJECT DIRECTOR: Dr. W. C. Van Deventer, Dept. of Biology, Western Michigan University, Kalamazoo, Mich. 49001. Tel: 616-383-1671.

C. PROJECT HEADQUARTERS:

a. Address: Same as B. Contact Dr. W. C. Van Deventer, Director, or Mr. Robert Sternberg, Associate Director, Michigan State Department of Education, Lansing, Mich. 48902.

b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Lucile Duyser, Science Coordinator for Inner City Schools, Grand Rapids, Mich., Editor of project materials; Consultants: John Rosemergy, Science Coordinator, Ann Arbor Public Schools, Ann Arbor, Mich.; Peter Wallus, Secondary Curriculum Coordinator, Kalamazoo, Mich.; Jack Kammeraad, Michigan State Department of Education.

E. PROJECT SUPPORT:

a. Organizational sponsorship: Michigan Science Curriculum Committee, operating under the Michigan State Department of Education.

b. Funding agencies: Michigan State Department of Education and Department of Biology, Western Michigan University. The project was supported by a Small Contract Grant from the Office of Education, U. S. Department of Health, Education and Welfare, in 1965-1966.

F. PROJECT HISTORY:

a. Principal originator: Michigan Science Curriculum Committee.

b. Date and place of initiation: October, 1963, Battle Creek, Michigan.

c. Reason for initiation: As a follow-up on the publication of their K-12 Science Program by the Michigan State Department of Education, the Committee decided to undertake research in the development of curricular materials at the junior high school level, an area which they considered to be relatively neglected at that time.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop and test open-ended laboratory experiences which are directed toward interdisciplinary ideas; to develop a means of evaluating the extent of students' understanding of these ideas as a result of open-ended laboratory experiences.

The project is centered on inquiry. The process of inquiry is taken to mean the approach to an idea by students and teacher in terms of open-ended laboratory experiences through questions asked at various levels of difficulty. As a basis for evaluation, the investigators believe that the questions students ask furnish a better indication of the extent and quality of their thinking in relation to an idea than any answers they may give to questions asked of them.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** Seventh grade general science. Some of the materials have been used successfully, however, at sixth and eighth grades.

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:**

1. Rationale of the project: Directing Inquiry Toward Cross-Cutting Ideas through the Use of Simple, Open-Ended Laboratory Experiences.
2. Criteria for Writing or Evaluating Laboratory Experiences.
3. Twelve units consisting of a total of 49 laboratory experiences. Each unit is directed toward a specific idea. The ideas are grouped under two of the basic assumptions of scientists in dealing with the natural world.

   Scientists think of the natural world in terms of relationships rather than absolutes:

   1a. Idea of interdependence and interrelationships in nature.
   1b. Idea of the necessary interaction of heredity and environment.
   1c. Idea of differential rates of processes in development.
   1d. Idea of measurement as an expression of relationship.
   1e. Idea of tools, machines and outside sources of energy as extensions of man's body and its capabilities.

   Scientists in looking at the natural world assume the universality of change:

   2a. Idea of dynamic equilibrium.
   2b. Idea of change and variation.
   2c. Idea of normal curves and warping factors.
   2d. Idea of gradients.
   2e. Idea of extrapolation and interpolation.
   2f. Idea of cycles and cyclic change.
   2g. Idea of directional change in response to the challenge of the environment.
4. Suggested Procedure for Teachers Wishing to Use MSCC-JHSP Materials.
5. Sample Tests, based on student questions.

K. **MATERIALS AVAILABLE FREE:** All of the materials (1 through 5) listed under J may be obtained from: Dr. W. C. Van Deventer, Director of MSCC-JHSP, at Project Headquarters.

L. **MATERIALS PURCHASABLE:** None

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** None

O. **USE OF PROJECT MATERIALS:**

a. Number of teachers using materials: Thirty-four teachers in 14 schools or school systems are using the materials. The materials have been sent to approximately 600 teachers and science supervisors in 29 states and 8 foreign countries, at their request.

b. Some specific schools where course is being taught: Michigan: Ann Arbor Public Schools, Ann Arbor; Kalamazoo Public Schools, Kalamazoo; Chippewa Middle School, Saginaw; Oakwood Junior High School, East Detroit; Wheatley School, Old Westbury, N. Y.; Armed Forces American High Schools, West Germany; Barringer High School, Newark, N. J.; Chute Junior High School, Evanston, Ill.

P. MATERIALS PRESENTLY BEING DEVELOPED: (Under J above) - Idea of templates or transference of pattern. Also, additional laboratory experiences under 1a, 2a, and 2c above. Additional tests based on use of the materials in the classroom.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The Director and Associate Director, and other members of the Michigan Science Curriculum Committee, work with teachers in Michigan schools who are using the materials. Since the project is not presently supported by a federal grant, work with teachers outside Michigan has to be delimited to correspondence, though this is extensive. The development of a formal training program must await further federal support. This is being sought.

R. PROJECT EVALUATION:

a. Instruments used: Tests are prepared from questions asked by students following completion of a series of laboratory experiences directed toward a specific idea. In taking the tests the students are asked to discriminate between questions which are related to the idea and those which are not so related.

b. Control groups: Under present conditions of support, it has not been possible to set up formal experimentation with control groups.

c. Feedback process: Teachers using the materials collect student questions and send these to the Director. He prepares tests from these questions. Each test is related to a specific idea. The teacher administers the tests and returns the results to the Director's office for evaluation.

d. Behavioral objectives identified: The behavioral objective sought is a demonstration of understanding of the ideas toward which the laboratory experiences are directed. It is believed that the questions students ask give a better indication of the extent and quality of their thinking in relation to ideas than the answers they might give to questions asked of them.

e. Research evidence of objectives achieved: Some preliminary experimentation has indicated significant correlations of the results of tests of the type described above with standard seventh grade achievement tests. Systematic collection of research evidence must await development of additional tests, and more extensive financial support than is now available.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The number of available laboratory experiences has been increased from 29 to 49. The over-all organization of the materials has been improved, with a definite relationship to two of the basic assumptions of scientists in dealing with the natural world. The number of correspondents to whom the materials have been sent has approximately doubled. Interest in the project has increased, especially outside Michigan and in foreign countries.

T. **PLANS FOR THE FUTURE:** It is anticipated that all necessary materials for the project will have been written by the end of the 1966-67 academic year. Additional work must involve formal evaluation, utilizing the theory of testing which has been set forth. Support is being sought for this from any available source.

A. PROJECT TITLE: MINNESOTA MATHEMATICS AND SCIENCE TEACHING PROJECT (MINNEMAST)

B. PROJECT DIRECTOR: James H. Werntz, Jr., 720 Washington Avenue S.E., Minneapolis, Minn. 55414, Tel. 612-373-3522, Contact: Project Director

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above.
b. Facilities available for viewing: Library, Laboratory, Trial Schools

D. PRINCIPAL PROFESSIONAL STAFF: Mason R. Boudrye, Administrator; Wells Hively, Research Director; Nathan W. Gottfried, Evaluation and Field Studies; and 40 additional scientists, mathematicians, writers, illustrators, and editors.

E. PROJECT SUPPORT:
a. Organizational sponsorship: University of Minnesota
b. Funding Agencies: National Science Foundation; U. S. Office of Education

F. PROJECT HISTORY:
a. Principal originator: Paul C. Rosenbloom, formerly Professor of Mathematics and Director of Minnesota School Mathematics and Science Center, University. Present address: Columbia Universit
b. Date and place of initiation: 1961; University of Minnesota, Minneapolis, Minn.
c. Reason for initiation: None described

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To produce coordinated mathematics and science curriculum for grades K-6, and organized material for in-service education of teachers.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Coordinated mathematics and science, elementary and college level.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Minnemath Reports
2. Mathematics: Units I - XXV
3. Science: Units K-1 through 2-6

K. MATERIALS AVAILABLE FREE: Item 1 from Project Headquarters

L. MATERIALS PURCHASABLE: Curriculum Units available at cost. Prices on request.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: 200 teachers using some of the materials in cooperating elementary schools associated with 10 colleges serving as trial centers.

P. MATERIALS PRESENTLY BEING DEVELOPED: 4. Integrated Science-Mathematics, 10 Units K and 1.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: In-service materials being revised and tested.

R. PROJECT EVALUATION: Classroom materials (mathematics K-4) and (science K-2) are used on an experimental basis in approximately 200 classrooms under the supervision of 10 cooperating colleges. Written comments about the clarity of the background material, ease of using the lessons, and observations of the children's reactions are obtained from the teachers. Achievement tests based on revision of items constructed last year have been developed for kindergarten and 1st grade. Evaluation of in-service mathematics and science materials is being conducted. Changes in subject matter performance and attitudes toward mathematics and science are being examined.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Continuing production of curriculum materials in science and mathematics.

T. PLANS FOR THE FUTURE: Curriculum materials for integrated science-mathematics, grades 2-6.

A. PROJECT TITLE: NSTA-NASA AEROSPACE SCIENCE EDUCATION PROJECT

B. PROJECT DIRECTOR: Albert F. Eiss, Associate Executive Secretary, National Science Teachers Association, 1201 Sixteenth Street, N.W. Washington, D.C. 20036, Tel. 202-223-9400, X521

C. PROJECT HEADQUARTERS:
a. Address: National Science Teachers Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036, Tel. 202-223-9400, X521, Contact: Project Director
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Mrs. Mary Blatt Harbeck (formerly, Coordinator of Science and Mathematics, Department of Public Instruction, Harrisburg, Pa.); Mr. Richard Crone, Science Education Specialist, Educational and Special Programs Office, Goddard Spac Flight Center, Greenbelt, Md.; Mr. Elva Bailey, Acting Chief, Edu ational and Special Programs Office, Goddard Space Flight Center, Greenbelt, Md.; Mr. Jack Callow, Educational and Special Programs Office, Goddard Space Flight Center, Greenbelt, Md.

E. PROJECT SUPPORT: National Aeronautics and Space Administration

F. PROJECT HISTORY:
a. Principal originator: National Science Teachers Association
b. Date and place of initiation: August 1, 1964, Washington, D.
c. Reason for initiation: Space science was not being adequatel treated by any of the curriculum projects being developed on a nation-wide basis.

Emerging science courses lacked emphasis on engineering and engineering applications.

The extreme interest shown by students in various aspects of space science was not being met with appropriate activities.

Because the study of space science involves principles from every major scientific discipline, it can provide an excellent medium for teaching basic principles of science.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To produce inquiry-centered mate ials in aerospace science for student use, to assist teachers in incorporating space science materials into their science programs and to encourage greater emphasis on the processes of scientific inquiry in the classroom.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Aerospace Science for the Junior High School

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: None

K. MATERIALS AVAILABLE FREE: Newsletter - Relay News; "Aerospace Bibliography"

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No plans for other than English.

O. USE OF PROJECT MATERIALS: None described

P. MATERIALS PRESENTLY BEING DEVELOPED: A space sciences source book for junior high school teachers: A Universe to Explore

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None described

R. PROJECT EVALUATION: None described

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported

T. PLANS FOR THE FUTURE: A Universe to Explore, when published, will be available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (price undetermined)

A. PROJECT TITLE: OAKLEAF INDIVIDUALIZED ELEMENTARY SCHOOL SCIENCE

B. PROJECT DIRECTOR: Dr. John Bolvin, Learning Research and Development Center, 160 N. Craig St., University of Pittsburgh, Pittsburgh, Pa. 15213, Tel. 412-683-8640

C. PROJECT HEADQUARTERS:
a. Address: 160 N. Craig St., University of Pittsburgh, Pittsburgh, Pa. 15213, Tel. 412-683-8640, Contact: Dr. Joseph Lipson
b. Facilities available for viewing: The project being conducted at Oakleaf School may be visited if adequate advance notice and alternate dates are given.

D. PRINCIPAL PROFESSIONAL STAFF: Joseph Lipson, Curriculum Director; John Bolvin, Project Director; Jacqueline Cohen, Lesson Writer and Designer; John Kirk, Teacher; George Miller, Administrator of material development.

E. PROJECT SUPPORT:
a. Organizational sponsorships: Learning Research and Development Center; Baldwin-Whitehall School District
b. Funding agency: United States Office of Education

F. PROJECT HISTORY:
a. Principal originators: J. Lipson, J. Bolvin; M. Campbell; R. Chemas
b. Date and place of initiation: June 1964, Mineral Industries Bldg., University of Pittsburgh
c. Reason for initiation: To provide concept development through individualized laboratory experiences. See papers listed below.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Objectives for the student are stated in terms of expected student performance in a laboratory setting.

Lessons involve individual kits of materials, tape cartridges, and response booklets.

Diagnostic tests with objects are used to find out what each student can or cannot do.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Science, Kindergarten - 6th grade

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Unit on Discrimination, Sorting and Classification
2. Unit on Observation and Measurement
3. Unit on Magnetism
4. Unit on Light

K. MATERIALS AVAILABLE FREE: Sample scripts of lessons are free, but supply is limited. Obtained by writing to Dr. Joseph Lipson.

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: One

b. Some specific schools where course is being taught: Oakleaf Elementary School in Baldwin-Whitehall School District.

P. MATERIALS PRESENTLY BEING DEVELOPED: Additional lessons drawn from AAAS program, SCIS program, and Dr. Novak's science series. Lessons are then rewritten and adopted for the individualized laboratory.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None described.

R. PROJECT EVALUATION:

a. Instruments used: Performance tests.

b. Control groups: None

c. Feedback process: Lessons which do not result in a very high percentage of children who pass the performance tests are rewritten and redesigned.

d. Behavioral objectives identified: Yes

e. Research evidence of objectives achieved: Performance data.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Preparation of additional lessons and refinement of overall goal of project.

T. PLANS FOR THE FUTURE: Aim is to produce about 1,000 laboratory lessons which develop to the process and content objectives.

A. PROJECT TITLE: PACIFIC NORTHWEST ASSOCIATION FOR COLLEGE PHYSICS (PNACP)

B. PROJECT DIRECTOR: Prof. Ronald Geballe, Dept. of Physics, University of Washington, Seattle, Wash. 98105 Tel: 206-543-2771

C. PROJECT HEADQUARTERS:
a. Address: c/o Dept. of Physics, University of Washington, Seattle, Wash. 98105 Tel: 206-543-6383, 2771. Contact the Project Director.
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Wilbur V. Johnson, Executive Officer; Ann Widditsch, Administrative Staff.

E. PROJECT SUPPORT:
a. Organizational sponsorships: Contributions of member institutions.
b. Funding agencies: Funds received from Sloan Foundation, Boeing Company, Tektronix Foundation. Funds are being sought from these and other private foundations; will be sought from the federal government.

F. PROJECT HISTORY:
a. Principal originators: Ronald Geballe and James Gerhart of the University of Washington; Kenneth Davis, of Reed College.
b. Date and place of initiation: May 7, 1966, Third Northwest Conference on College Physics, University of Washington, Seattle, Washington.
c. Reason for initiation: Highly trained physics faculty, funds for research, and support for teaching improvements and innovations have all tended to concentrate in the major graduate centers. At the same time a steadily increasing number of college students are beginning their academic careers in two-year and four-year colleges. These two opposing trends have already created a serious problem that must be overcome in order to meet not only the demands for trained personnel, but also the need for adequate science education in general.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Regionally to increase contact and communication among college physics teachers, and to promote programs beneficial to the teaching of college physics.

To sponsor and support annual region-wide meetings; to sponsor and support smaller conferences on specific problems in physics teaching; to support leaves-of-absence and grants-in-aid for research and curriculum developments.

To provide assistance in recruitment of new faculty, to assist with preparation of proposals for governmental or foundation support of research and departmental development, to assist in curriculum planning, to coordinate cooperative research programs among member departments, to assist with the establishment of summer programs of study and research.

To serve as an information center in regard to programs of research support, fellowships, curriculum trends, instructional equipment, and teaching aids; to act as coordinator for lending of equipment and teaching aids among member institutions, to collect, collate, and disseminate data on the teaching of physics within the region.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Undergraduate college physics.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Constitution and By-Laws
2. Objectives and Programs
3. Newsletter #1
4. Physics in Community Colleges

K. MATERIALS AVAILABLE FREE: All listed in J.

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS: Not applicable

P. MATERIALS PRESENTLY BEING DEVELOPED: None

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Not applicable

R. PROJECT EVALUATION: Not applicable

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Decided to organize at 3rd Northwest Conference on College Physics, May 6-7, 1966, Seattle; meeting of Board of Directors to draft Constitution and By-Laws, at AAPT in Bozeman, Mont., June 17, 1966; sponsor and support Conference on Physics in Community Colleges, at University of Washington, Seattle, November 18-19, 1966; publish "Physics in Community Colleges," January, 1967.

T. PLANS FOR THE FUTURE: Sponsor and support Conference on Physics in Four-Year Colleges, spring, 1967; publish "Physics in Four-Year Colleges," July, 1967.

A. PROJECT TITLE: PATTERNS IN ARITHMETIC

B. PROJECT DIRECTOR: Dr. Henry Van Engen, Research and Development Center for Learning and Re-education, 1404 Regent Street, Madison, Wis. 53706, Tel. 608-262-5866

C. PROJECT HEADQUARTERS:
a. Address: Research and Development Center for Learning and Re-education, 1404 Regent Street, Madison, Wis. 53706, Tel. 608-262-5866, Contact: Dr. Henry Van Engen
b. Facilities available for viewing: Video taping sessions; Actual telecasts

D. PRINCIPAL PROFESSIONAL STAFF: Henry Van Engen, Director; Robert Parr, Television Teacher; Marguerite Melin, Television Teacher; Walter Leffin, Project Assistant; Ann Schonberger, Project Assistant; Thomas Romberg, Principal Investigator; Jim Braswell, Research Assistant

E. PROJECT SUPPORT:
a. Organizational sponsorships: Research and Development Center for Learning and Re-education, University of Wisconsin; Wisconsin School of the Air, WHA-TV, University of Wisconsin
b. Funding agency: United States Office of Education; Department of Health, Education, and Welfare, under the provision of the Co-operative Research Program

F. PROJECT HISTORY:
a. Principal originator: Dr. Henry Van Engen
b. Date and place of initiation: September 1, 1964, University of Wisconsin
c. Reason for initiation: Serve an inservice function to elementary school teachers both in methodology of presentation of concepts and in new content material presently being introduced in the elementary schools; serve as an effective instructional media to participating students.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: A basic objective of this project is that of teacher training. However, this is not to be interpreted to mean it is a sequence of telecasts to be viewed by teachers only. It is much more than that. It is a self-contained program designed to be used by classroom units.

The teacher-training aspect comes via the telecasts and the teacher commentary. In the commentary, the necessary mathematics for each telecast is explained to the teacher, who then, by watching the telecasts with the children, views these concepts in an operational way. That is, she sees these concepts developed for the children using methodologies deemed appropriate by mathematics educators and master teachers. She thereby obtains a point of departure from which she may work in devising her own methods of teaching the concepts presented. The telecasts in no way replace the classroom teacher, but supplement her own efforts by providing a framework of reference in which she may operate. They are not designed to teach any concept in such a way that after viewing, the child will have a complete mastery of the concept. What it does is to introduce the concepts to the children in a way deemed appropriate by mathematics educators, master teachers and television personnel, allow the classroom teacher to observe how a particular concept may be developed, and allow the classroom teacher to become familiar with some concepts that are presently being introduced in the first four grades of the arithmetic curriculum.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Arithmetic, Grades 1, 2, 3 and 4, ages 6, 7, 8 and 9

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Thirty-two video tapes, Grade 1
2. Sixty-four video tapes, Grade 3
3. Teacher commentary, Grade 1
4. Teacher commentary, Grade 3
5. Pupil exercise book, Grade 1
6. Pupil exercise book, Grade 3

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: Presently, none

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: First grade, 194; Second grade, 60; Third grade, 280; Fourth grade, 60.

b. Some specific schools where course is being taught: Madison, Wis.; Milwaukee, Wis.; Birmingham, Ala.; Huntsville, Ala.; Racine Public Schools, Janesville, Wis.

P. MATERIALS PRESENTLY BEING DEVELOPED:

7. 48 video tapes for second grade
8. 64 video tapes for fourth grade
9. Teacher commentaries and pupil exercise books for second and fourth grades

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: See "H"

R. PROJECT EVALUATION:

- a. Instruments used:
  - i. Third Grade
    1. Attitude inventories - pupil attitudes; teacher attitudes
    2. Arithmetic Computation; Stanford Primary School Battery for Pretest (1/2 sample).
    3. ETS Cooperative Primary test for pretest (1/2 sample).
    4. Midsemester test designed by ETS explicitly for Patterns in Arithmetic
    5. Final test. Comparable forms of (2) and (3).
  - ii. First Grade
    1. Attitude inventories - pupil attitudes; teacher attitudes

2. Midsemester test designed by ETS explicitly for Patterns in Arithmetic

3. Final test. Test designed by ETS explicitly for Patterns in Arithmetic

b. Control groups: None

c. Feedback process: Teacher Log Book in addition to above, Part A. Also, in the first year of development, individual teacher feedback, school visitations by project staff.

d. Behavioral objectives identified: Yes

e. Research evidence of objectives achieved: Data in process of being evaluated.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: None described

A. PROJECT TITLE: THE PENNSYLVANIA EARTH AND SPACE SCIENCE IMPROVEMENT PROGRAM

B. PROJECT DIRECTOR: William H. Bolles, Bureau of General and Academic Education, Box 911, Harrisburg, Penn. 17126. Tel: 717-787-7320.

C. PROJECT HEADQUARTERS:

a. Address: Same as B. Contact any member of the professional staff: Joseph Anthony; William Bolles; Irvin Edgar.

b. Facilities available for viewing: None.

D. PRINCIPAL PROFESSIONAL STAFF: John E. Kosoloski, Director of Bureau of General and Academic Education; Carl E. Heilman, Coordinator of Division of Math and Science; Joseph Anthony, Science Advisor; William Bolles, Science Advisor - Earth and Space Science; Irvin Edgar, Science Advisor - Biological Sciences.

E. PROJECT SUPPORT:

a. Organizational sponsorships: Commonwealth of Pennsylvania, Department of Public Instruction; Bureau of General and Academic Education.

b. Funding agencies: State funds, NDEA Title III.

F. PROJECT HISTORY:

a. Principal originators: Charles H. Boehm (former Supt. of Public Instr. 1956-1964); Lee Boyer, Science and Math Specialist (retired) 1958-1964; John Moss, Chairman, Dept. of Geology - Franklin and Marshall College; John E. Kosoloski, former Coordinator Earth & Space Science, Dept. of Public Instruction.

b. Date and place of initiation: 1958, Department of Public Instruction.

c. Reason for initiation: Following Dr. Boehm's attendance at a 1958 Air Force Convention in Dallas, Texas, he said, "This experience led to the realization that the space age in which we now live, and about which we know so little, will be commonplace to our children. Therefore, the inclusion of earth and space science in the programs in Pennsylvania's public schools has become an imperative issue."

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The earth and space science teaching guides were developed as resource material from which individual schools may develop an earth and space science curriculum suited to their own individual and particular needs. The program continues with the purpose of increasing the effectiveness of earth and space science instruction by a process of improved teacher competency.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Earth and Space Science for Elementary Grades. Earth and Space Science for grade 9 as a general education course for all pupils and/or grades 11 and 12 as an advanced elective.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Earth and Space Science; a guide for secondary teachers, 158pp.

2. Earth and Space Science for elementary teachers, 67pp. Both teaching guides are designed as resource material and not a course of study.

K. MATERIALS AVAILABLE FREE: 1 and 2 available free to schools in Pennsylvania - Pennsylvania Department of Public Instruction.

L. MATERIALS PURCHASABLE: 1. \$1.28 plus .07 tax - \$1.35; 2. \$.16 plus .01 tax - \$.17.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS: Over 10,000 copies distributed to date.

P. MATERIALS PRESENTLY BEING DEVELOPED: 1. Currently being revised; 2. Currently being revised; 3. The Utilization of a Planetarium in the School Curriculum.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Inservice workshops, for Pennsylvania teachers, in both earth and space science and the use of the planetarium are being held to increase teacher competency. Science advisors consult with the Bureau of Teacher Education, and participate in the evaluation of college teacher education programs, in order to strengthen undergraduate preparation in science and mathematics.

R. PROJECT EVALUATION:

a. Instruments used: No formal evaluation program.

b. Control groups: No.

c. Feedback process: Forms are provided for teacher evaluation of material and asked for suggestions on improvement of content.

d. Behavioral objectives identified: Now in process.

e. Research evidence of objectives achieved: In 1962 the Department of Public Instruction conducted an evaluation of students taking the traditional ninth grade general science course and the ninth grade earth and space science course. The conclusions drawn from this study were: The results of the Earth and Space Science Test, Form A, showed conclusively that the ninth grade earth science students were superior to the ninth grade general science students in the area tested. (Further study by item analysis was made to see if there was specific content superiority). Earth and Space Science taught at the seventh and eighth grade levels was possibly as successful as at the ninth grade. For those ninth grade students measured by Form B of the Earth and Space Science Test, the results were similar. On no items in the test did the General Science group score significantly higher than the Earth Science group.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not reported previously.

T. PLANS FOR THE FUTURE: Revision of publications to be completed by June, 1968. Revision of materials on workshop programs to continue indefinitely.

A. PROJECT TITLE: PENNSYLVANIA RETRIEVAL OF INFORMATION IN MATHEMATICS EDUCATION SYSTEM (PRIMES)

B. PROJECT DIRECTORS: Emanuel Berger, Bureau of Research Administration and Coordination; Doris E. Creswell, Bureau of General and Academic Education, Department of Public Instruction, Box 911, Harrisburg, Pa. 17126, Tel. 717-787-6016

C. PROJECT HEADQUARTERS:

a. Address: Same as "B" above. Contact Emanuel Berger or Doris E. Creswell

b. Facilities available for viewing: At the project headquarters: file of the document microfilm aperture cards, book form indexes, microfilm reader-printer, filmstrip and tape describing the project, library of twenty (20) basal elementary school mathematics textbooks.

D. PRINCIPAL PROFESSIONAL STAFF: Emanuel Berger, Director; Doris E. Creswell, Director; Joy Mahachek, Indiana University of Pennsylvania (retired), Consultant; Joseph Lipson, Learning Research and Development Center, University of Pittsburgh, Consultant; C. Alan Riedesel, The Pennsylvania State University, Consultant; Jack Sparks, The Pennsylvania State University, Consultant; Marilyn Suydam, Analyst, Research Studies; Edith Kohut, Analyst, Behavioral Objectives; Donald Deep, Analyst, Behavioral Objectives; Auerbach Corporation, Systems Consultants

E. PROJECT SUPPORT:

a. Organizational sponsorship: Commonwealth of Pennsylvania, Department of Public Instruction

b. Funding agencies: Commonwealth of Pennsylvania, Department of Public Instruction; U. S. Office of Education

F. PROJECT HISTORY:

a. Principal originators: Emanuel Berger and Doris E. Creswell

b. Date and place of initiation: January 1965; Commonwealth of Pennsylvania, Department of Public Instruction

c. Reason for initiation: To advise school personnel in developing their mathematics curriculum. As a state education agency the Department is responsible for advising school districts in their instructional programs. Changes in the mathematics curriculum have been dramatic in recent years and local school districts are in need of consultative services in applying these changes to their local needs.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To assist local school districts in making decisions about selecting a mathematics program; to provide a resource for individualizing instruction and evaluating achievement; to plan inservice education compatible with the instructional materials selected; to assist in the development of classroom diagnostic and achievement tests; to provide source materials for developing teacher pre-service and inservice instructional programs in the content and methodology of elementary school mathematics; to provide source materials for identifying significant completed research which will serve as a base for planning future research; to serve as a model for managing information in other curriculum disciplines. Unique characteristics: The system will contain a comprehensive library of published textual materials that have been analyzed in detail. Similarly, each of the research studies are analyzed, abstracted, and catalogued. The information will be readily retrievable and answers will be provided to users that relate to their specific questions.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Elementary School Mathematics, Grades K-8; Ages 5-14

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Analysis, description, annotation and the original published material microfilmed on aperture cards. Approximately 10,000 cards are now available.
2. Detailed features describing each of the basal programs.
3. Book-form indexes.
4. Filmstrip and tape describing project.
5. Authority lists used to catalogue the lessons
   i. content
   ii. behavioral objectives

K. MATERIALS AVAILABLE FREE:
2. Detailed features describing each of the basal programs.
4. (Loan)
5. Authority lists used to catalogue the lessons. (i) content (ii) behavioral objectives

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: 500
b. Some specific schools where materials are being used: Kiski Area School District, Vandergrift, Pa.; Penn-Trafford School District, Harrison City, Pa.; Franklin Area School District, Murraysville, Pa.; Marion Center Area School District, Marion Center, Pa.

P. MATERIALS PRESENTLY BEING DEVELOPED:
6. An additional 15,000 cards described above in question J, item 1, are in preparation.
7. Selected experimental research studies in elementary school mathematics for the period 1955-65. Each study is analyzed according to problems, design paradigm, statistical procedures, tests used, variables controlled, and conclusions. About 120 studies will comprise the initial file. Each study will be microfilmed on microfiche, together with the analysis and an abstract.
8. A descriptive brochure highlighting the project's objectives and procedures is in preparation.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A workshop for schools participating in the pilot study is planned for the last two weeks of June, 1967. Content: mathematics content based on the content list used to categorize the lessons; behavioral objectives based on the behavior list used to categorize the lessons; practice in using the two authority lists to categorize sample lessons; practice in querying the system and finding answers. Format: content will be presented in a conventional lecture-group discussion setting. A textbook covering the mathematics content will be used; a laboratory-workshop is planned for practice in cataloging sample lessons and for querying the system. Place: Westmoreland Regional Instructional Materials Center, Greensburg, Pa., under the auspicies of the University of Pittsburgh at Greensburg, Pa.

R. PROJECT EVALUATION:

a. Instruments used: Detailed records of user-system interaction.
b. Control groups: No
c. Feedback process: Each question-answer is recorded. Users also indicate degree of answer relevance. Large group evaluation conferences are planned giving an opportunity for project staff personnel to meet with the users to identify degree of progress, problem areas, and methods for improving procedures.
d. Behavioral objectives identified: Not applicable
e. Other pertinent information: A detailed survey is planned for the schools in the Commonwealth to determine the status of curriculum development in mathematics.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Six school districts in two counties have been selected to test the effectiveness of the system. Computer programs have been written to create a master index file, master content and behavior file, to print analysis sheets, up-date index file, and punch an index card deck. Long range plans have been formulated to establish satellite centers that would serve all school districts in Pennsylvania.

T. PLANS FOR THE FUTURE: Publications: The project staff has been invited to submit an article for publication in the Arithmetic Teacher.

A. **PROJECT TITLE:** PENNSYLVANIA SCIENCE IN ACTION PROGRAM

B. **PROJECT DIRECTOR:** Mr. Irvin T. Edgar, Science Education Advisor. Department of Public Instruction, Bureau of General and Academic Education, Box 911, Harrisburg, Pennsylvania 17126

C. **PROJECT HEADQUARTERS:**
   a. Address: Penna. Dept. of Public Instruction, Box 911, Harrisburg, Pa. 17126, Tel. 717-787-7320, Contact: Any member of the professional staff - Mr. Joseph Anthony, Science Specialist; Mr. William Bolles, Physical Science Specialist; Mr. Irvin T. Edgar, Biological Sciences Specialist
   b. Facilities available for viewing: None at present

D. **PRINCIPAL PROFESSIONAL STAFF:** William H. Bolles, Science Advisor; Carl E. Heilman, Coordinator Science and Mathematics Division; Joseph P. Anthony, Science Advisor; Irvin T. Edgar, Science Advisor

E. **PROJECT SUPPORT:**
   a. Department of Public Instruction, Commonwealth of Pennsylvania
   b. Funding agencies; State Funds, NDEA, Title III

F. **PROJECT HISTORY:**
   a. Principal originators: Albert F. Eiss and Mary Blatt Harbeck, Department of Public Instruction
   b. Date and place of initiation: 1961, Harrisburg, Pa.
   c. Reason for initiation: To provide direction and assistance to local schools in establishing laboratory science learning activities and to prepare materials for local school curricula and teacher inservice use.

G. **PRESENT COMMERCIAL AFFILIATIONS:** None

H. **PURPOSES AND SPECIFIC OBJECTIVES:** The materials are utilized in inservice workshops where resource teachers are prepared to develop and implement inservice programs for their own school systems. In addition, school systems, under the guidance of state Science advisors, use the series in science curriculum revision.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** Science - Kindergarten through college.

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:**
   1. A Recommended Continuum for Science Education from Kindergarten through College, Continuum Series number 2, Department of Public Instruction, Harrisburg, 1963.
   2. Curriculum Continuum Series: Supplement to No. 2: Science, College Courses for Non-science Majors, 1964.
   3. Microbiology, for elementary school children, Department of Public Instruction, Harrisburg, Pennsylvania, 1963.
   4. Properties of Numeration Systems, Mathematics Series No. 1.
   5. Teaching Fractions with the Number Line, Mathematics Series No. 2
   6. An Introduction to Sets and Set Notation, Mathematics Series No. 3

7. Science in Action Series: No. 1 - A Guide for Teaching Science
8. Science in Action Series: No. 2 - Measurement
9. Science in Action Series: No. 3 - Simple Machines
10. Science in Action Series: No. 5 - Force, Energy and Power (second printing)
11. Science in Action Series: No. 6 - Simple Plants and Animals (second printing)
12. Science in Action Series: No. 7 - Insects and Spiders (experimental edition)
13. Science in Action Series: No. 8 - Problems of Space Travel
14. Science in Action Series: No. 9 - Astronomy
15. Science in Action Series: No.10 - Vertebrates
16. Science in Action Series: No.11 - Meteorology
17. Science in Action Series: No.12 - Ecology - Indoors and Outdoors
18. Science in Action Series: No.13 - Physiology
19. Science in action Series: No.14 - Basic Electricity

K. MATERIALS AVAILABLE FREE: Write for price lists. These are available free to some groups, and not to others.

L. MATERIALS PURCHASABLE: Write for price lists.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: None described
  b. Some specific schools where course is being taught: Cambridge Springs Joint Schools, Cambridge Springs, Pa.; Uniontown City Schools, Uniontown, Pa.; Northern Lehigh Joint Schools, Slatington, Pa.

P. MATERIALS PRESENTLY BEING DEVELOPED:
  20. Science in Action Series: No.15 - Heat, Light and Sound

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Inservice workshops to prepare resource teachers to work with elementary teachers in their home districts are being expanded.

R. PROJECT EVALUATION:
  a. Instruments used: Informal classroom trials and responses of schools using the materials.
  b. Control Groups: None
  c. Feedback process: Feedback forms are provided for teacher and supervisor use. Provision is made for evaluation, description of manner in which materials are utilized, and suggestions for improvement of series.
  d. Behavioral objectives identified: Now in the process.
  e. Research evidence of objectives achieved: Not applicable without behavioral objectives described under D.
  f. Other pertinent information: Summer workshops were conducted and follow-up activities are in progress. The booklet "Electricity" is in the process of being printed.

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S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not previously reported.

T. **PLANS FOR THE FUTURE:** Plans are being completed to provide more intensive workshop experience and consultative assistance at the local level. In addition, efforts are underway to develop procedures for integrating mathematics and science instruction on the junior high school level initially. Present activity plans include a conference to begin development of behavioral objectives.

A. PROJECT TITLE: PHYSICAL SCIENCE FOR NONSCIENCE STUDENTS (PSNS)

B. PROJECT DIRECTOR: Dr. Lewis G. Bassett, Rensselaer Polytechnic Institute, Troy, N.Y. 12181, Tel. 518-270-6341

C. PROJECT HEADQUARTERS:
  a. Address: Same as "B". Contact: Dr. A. A. Strassenburg, American Institute of Physics, 335 East 45 Street, N.Y., N.Y. 10017
  b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Lewis G. Bassett, Director; A. A. Strassenburg, Assoc. Director and Chairman of Advisory Board; R. L. Sells, Assoc. Director; Elizabeth A. Wood, Assoc. Director.

E. PROJECT SUPPORT:
  a. Organizational sponsorship: Rensselaer Polytechnic Institute
  b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
  a. Principal originators: Commission on College Physics; Advisory Council on College Chemistry
  b. Date and place of initiation: April 1965, Rensselaer Polytechnic Institute, Troy, N. Y.
  c. Reason for initiation: To fill the need for a college course in physical science for nonscience students, designed especially for those with low aptitude for and interest in science and mathematics.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The objectives are to introduce the nonscience students to the essential nature of scientific inquiry and experimentation and to change their attitude toward science from one of anxiety or disinterest to one of confidence and interest. It is not a survey course. To give time for exploration at a suitable pace, attention is focused on a narrow range of topics including solid matter and techniques for its investigation. Light, motion, electricity, liquids and gases and other fields are studied when necessary.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Physics and chemistry interwoven in the study of matter. College level, at whatever year the "terminal" course in physical science is given.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
  1. An Approach to Physical Science (PSNS text), Preliminary Edition, 1965. 5 Volumes, paper-covered, spiral bound.
  2. PSNS Newsletter No. 1. December, 1965.
  3. An Approach to Physical Science (PSNS text), Second Preliminary Edition, 1966. 3 Volumes, paper-covered, stitched.
  4. PSNS Newsletter No. 2. November, 1966.
  5. Supplementary Chapter: Some Typical Properties of Acids and bases (Preliminary Edition, 1966).

K. MATERIALS AVAILABLE FREE: Nos. 3 and 5 until present supply is exhausted. Dr. Lewis G. Bassett, Rensselaer Polytechnic Institute, Troy, N.Y.

L. MATERIALS PURCHASABLE: Equipment for performing experiments described in the text; Damon Educational, Inc., 240 Highland Avenue, Needham, Mass. 02194

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 23

b. Some specific schools where course is being taught: Alverno College, Milwaukee, Wis.; Earlham College, Richmond, Ind.; State University College at Geneseo, Geneseo, N.Y.; Western College for Women, Oxford, Ohio

P. MATERIALS PRESENTLY BEING DEVELOPED:

6. An Approach to Physical Science (PSNS text), Third Edition, 1967
7. Source Book for PSNS Teachers
8. Further Supplementary Chapters (to be used at the option of the instructor, where the pace of progress of the class allows the inclusion of more material): Magnetism, Astronomy, Equilibrium, Avogadro's Number, Geometrical Optics, Geology, Biological Molecules, The Nucleus.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: 1967 Summer Institute at Rensselaer Polytechnic Institute, Troy, N.Y. 8 weeks. Background enrichment in chemistry for those trained in physics and physics for those trained in chemistry. Also discussions of the philosophy and subject matter of the PSNS course with emphasis on experiments.

R. PROJECT EVALUATION:

a. Instruments used: Feedback from teachers and students (see C., below); A uniform pre-test, mid-test and post-test for all students at trial colleges; In 1967-68: Evaluation by Educational Testing Service.

b. Control groups: In several of the trial colleges, PSNS materials are being used only in one of two or more sections of physical science for nonscience students. Other sections are using previously designed courses.

c. Feedback process: Teachers fill out brief feedback froms at the completion of each chapter, indicating what went well and what did not. All teachers meet for a 2-day feedback meeting in February and for a 1-week feedback meeting in the spring. Some teachers have students write comments about the course.

d. Behavioral objectives identified: Yes. Ability to approach new problem situations with a scientific attitude. Confidence and interest in performing simple experiments and observing phenomena. Ability to answer substantive questions on the material covered in the course.

e. Research evidence of objectives achieved: The enthusiasm of the teachers for this approach in comparison to other approaches they have used. Essays from students indicating that this is the first science course they ever enjoyed and understood.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Spring 1967: Chapters 1-9 of third preliminary edition to commercial publisher; Summer 1967: Completion of third edition of text by summer writing group. Source Book and supplementary Chapters in preliminary edition; Winter 1967-68: Further trial of all materials (probably about 50 schools); Summer 1968: Final revision of Source Book and Supplementary Chapters; Fall 1968: Publication of materials by commercial publisher. Phase out.

A. PROJECT TITLE: PHYSICAL SCIENCE STUDY COMMITTEE PHYSICS COURSE* (PSSC)

B. PRINCIPAL ORIGINATOR: Educational Services Incorporated, under the Leadership of Jerrold R. Zacharias and Francis L. Friedman

C. PROJECT DIRECTOR: Jerrold R. Zacharias

D. PROJECT HEADQUARTERS ADDRESS: PSSC-ESI, 164 Main Street, Watertown, Mass. 02172

E. PROFESSIONAL STAFF: Uri Haber-Schaim; James Walter; Judson B. Cross; Ervin H. Hoffart; John DeRoy; and Andrea Julian, Staff; Byron Youtz, Editor, Second Edition PSSC; Gavriel Elek, Visiting Staff

F. PROJECT SUPPORT:
   a. Organizational Sponsorship: Educational Services Incorporated
   b. Funding agency: National Science Foundation

G. SPECIFIC PURPOSES AND OBJECTIVES: To present physics as a unified but continuing process by which men seek to understand the nature of the physical world. Employs laboratory experimentation to encourage the student's spirit of inquiry.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: High School physics dealing with matter, time, space, light, motion and the nature of electrical forces and energy.

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION:
   1. Physics, 1960; revised ed. 1965 (the PSSC physics course textbook published by D. C. Heath and Co., Boston, Mass.)
   2. Laboratory Guide for Physics, 1960; revised ed. 1965 (to accompany the textbook, D. C. Heath and Co., Boston, Mass.)
   3. PSSC Physics Teacher's Resource Book and Guide. (D. C. Heath and Co., Boston, Mass.)
   4. Laboratory apparatus (manufactured by Macalaster Scientific Corporation, Watertown, Mass.; Science Electronics, Inc. (LINCO), Cambridge, Mass.; and Welch Scientific Company, Skokie, Ill.)
   5. PSSC Films and the Teacher's Guide to PSSC Films. More than fifty films and the guide are distributed by Modern Learning Aids, 3 East 54th Street, New York.
   6. Science Study Series. (Over 40 paperback books that provide authoritative science literature for students and adults. Published by Doubleday-Anchor Books)
   7. Tests of the Physical Science Study Committee, Series O, N, and S. (Available from Cooperative Test Division, Educational Testing Service, Princeton, N.J.)

J. USE OF PROJECT MATERIALS: Over 5,000 teachers are using the complete program, and between 2,000-3,000 teachers are using portions of the materials. The ESI Quarterly Report lists specific schools where materials are being used.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Japanese, Spanish, Hebrew, French, Danish, Norwegian, and others.

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: None described.

N. MATERIALS AVAILABLE FREE: Quarterly Reports of Educational Services Incorporated, 164 Main Street, Watertown, Mass. 02172

O. MATERIALS PURCHASABLE: Items Nos. 1, 2, 3, 4, 5, 6 and 7.

P. SPECIFIC PLANS FOR EVALUATION: Preliminary editions were tried, evaluated and revised for three years before being published commercially in 1960. Teachers submitted feedback forms.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: NSF supported summer, in-service, and academic year teacher training institutes.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: A second edition of all course materials has been published.

S. PLANS FOR THE FUTURE: None described

*Response made for the 1966 Report.

A. PROJECT TITLE: PONCE CURRICULUM CENTER - PRODUCTION AND TRANSLATION OF SCIENCE AND MATHEMATICS MATERIALS. PRODUCTION OF MATERIALS FOR SPANISH

B. PROJECT DIRECTOR: Mrs. Josefina S. Oliver, Box 1125, Ponce, P. R. 00732, Tel. 842-8052

C. PROJECT HEADQUARTERS: Santa Maria Shopping Center, Box 1125, Ponce, P. R. 00732, Tel. 842-8052, Contact: Mrs. Oliver

D. PRINCIPAL PROFESSIONAL STAFF: Josefina S. Oliver, Director; Father Joseph Frohnhoefer, Consultant (Physics); Sister Joseph Agnes, Consultant (Biology); Julio Rivera, Consultant (Chemistry); Jose Valentin, Consultant (Mathematics); Eugene Francis, Consultant (Mathematics).

E. PROJECT SUPPORT: Ford Foundation and Department of Education of Puerto Rico.

F. PROJECT HISTORY:
a. Principal originator: Department of Education.
b. Date and place of initiation: 1963; Ponce, Puerto Rico.
c. Reason for initiation: Need for the improvement of curriculum materials in science and mathematics, need for intensive teacher training.

G. PRESENT COMMERCIAL AFFILIATIONS: None described.

H. PURPOSES AND SPECIFIC OBJECTIVES: Production of curriculum materials in science, mathematics and Spanish; In-service training for teachers in the new programs of science and mathematics; In-service training for resident teachers to prepare them to work as coordinators.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Science - elementary and secondary; Mathematics - elementary and secondary; Spanish - elementary and secondary.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Guides for work in Spanish - La cancion verde, El arbol de la violeta, Marianela.
2. Guides for work in Spanish - Antologia de cuentos puertorriquenos, Verso y prosa de Juan Ramon Jimenez.
3. Ejercicios de lectura para 1er grado - A la escuela, A jugar y a gozar, Amigos de aqui y de alla.
4. Programmed Instruction in Mathematics.
    i. Addition and subtraction of common fractions (3rd revision).
    ii. Addition and subtraction of heterogenous fractions (3rd revision).
    iii. Multiplication of fractions.
    iv. Division of fractions.
5. Short lessons on programmed instruction in mathematics (number line, addition of whole numbers, the clock).
6. Vocabulary for Modern Algebra and Modern Geometry.
7. Exercises for use with mathematics texts Book 6 - Laidlaw series and Book 6 - Silver Burdett Series.

Exercises for use with mathematics texts Book 3 - Laidlaw series and Book 3 - Silver Burdett Series.

8. Units on General Mathematics for use in 10th grade Vocational School

9. Worksheets for the preparation of simple science equipment for use in the elementary school

10. Translation of booklets on Slide Rule and Scientific Notation Chem Study.

11. 3 tests for B.S.C.S. 7th grade
    3 tests for Chemistry 8th grade
    2 tests for Physics 9th grade

12. Short lessons for individualizing instruction for use in 3rd grade rural schools.

K. MATERIALS AVAILABLE FREE: Sample copies are mimeographed.

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Spanish

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Spanish

O. USE OF YOUR PROJECT MATERIALS: Ramiro Colon School; Cerillos Rural School; Brumhaugh School; Jaime L. Drew School; Degetau School; McDougal School

P. MATERIALS PRESENTLY BEING DEVELOPED:

13. Guides are being prepared for use of materials for science in the Junior High School.

14. Adapting a Geology unit from Maryland to Puerto Rico.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Year institute for 35 teachers of mathematics of elementary grades giving emphasis to modern trends in the teaching of mathematics. Offered in Catholic University of Puerto Rico. Year institute for 30 teachers of elementary science to train them in "Science - a Process Approach. Offered in Catholoc University. Seminars for teachers held weekly in the Center for teachers of B.S.C.S. 7th grade, Chemistry 8th grade, Physics 9th grade. Seminars for teachers of High School mathematics (Algebra and Geometry) once a month. Seminars for teachers of 7th and 9th grade mathematics twice a month. Seminars for teachers of Spanish in the Junior High School once a month. Seminars for teachers of mathematics in elementary school (6th grade) twice a month.

R. PROJECT EVALUATION:

a. Instruments used: Evaluation sheets; Commentaries by teachers

b. Control groups: Yes

c. Feedback process: Try out the work and report on sucess, failure, difficulties, problems encountered, possible changed needed.

d. Behavioral objectives identified: None described

e. Research evidence of objectives achieved: Comparison of results of tests administered before and after teaching units in Programmed Instruction.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not described

T. **PLANS FOR THE FUTURE:** We will work on individualizing instruction especially in mathematics and Spanish.

In science the course of A.A.A.S. - Science - A Process Approach will be used.

A. PROJECT TITLE: THE PORTLAND PROJECT - INTEGRATION OF CHEMISTRY AND PHYSICS FOR SECONDARY SCHOOLS

B. PROJECT EXECUTIVE SECRETARY: Dr. Michael Fiasca, Portland State College, P. O. Box 751, Portland, Ore. 97207, Tel. 503-226-7271, X1291

C. PROJECT HEADQUARTERS:
   a. Same as "B"
   b. Facilities available for viewing: Pilot classes at several local high schools

D. PRINCIPAL PROFESSIONAL STAFF: None but executive secretary listed above

E. PROJECT SUPPORT:
   a. Organizational sponsorships: Portland State College, Portland School District
   b. Funding agencies: Portland School District; National Science Foundation

F. PROJECT HISTORY:
   a. Principal originators: William McCord, David Porter, Vernon Cheldelin, Michael Fiasca
   b. Date and place of initiation: 1963, Portland, Ore.
   c. Reason for initiation: To identify content areas in chemistry and physics which are interdependent; promote economy of time in teaching the two disciplines in an integrated fashion.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: Develop teacher guides that display logical content sequence inherent in chemistry and physics; Evaluate the integrated chemistry-physics course.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Grades 10-11 or Grades 11-12

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Student Guide for CBA-PSSC Integration
   2. Student Guide for CHEM-PSSC Integration
   3. Teacher Guide for CBA-PSSC Integration
   4. Teacher Guide for CHEM-PSSC Integration
   5. Evaluation Report
   6. Enrollment Statistics 1965
   7. Enrollment Statistics 1967 (Now being compiled)

K. MATERIALS AVAILABLE FREE: 5, 6, and 7; Dr. Michael Fiasca, Portland State College, P. O. Box 751, Portland, Ore. 92707

L. MATERIALS PURCHASABLE: 1, 2, 3, and 4 Five Dollars for the entire set; Two-fifty for one student guide and one teacher guide. Portland Curriculum Center, 631 N.E. Clackamas St., Portland, Ore. 97232

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Approximately 80

b. Some specific schools where course is being taught: Jefferson High School, Portland, Ore.; Jackson High School, Portland, Ore.; Washington High School, Portland, Ore.

P. MATERIALS PRESENTLY BEING DEVELOPED: None

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None

R. PROJECT EVALUATION:

a. Instruments used: Achievement tests developed by CBA, CHEM and PSSC; Watson-Glaser Critical Thinking Appraisals; Hugh Allen Attitudes Inventory Towards Science.

b. Control groups: Six treatment groups and twelve control groups

c. Feedback process: None described

d. Behavioral objectives identified: None but those set forth in the critical thinking appraisals mentioned above.

e. Research evidence of objectives achieved: A detailed evaluation may be obtained as described above.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The second enrollment survey is underway.

T. PLANS FOR THE FUTURE: A proposal has been submitted to the National Science Foundation for support of a project to bring biology, into the integration.

A. PROJECT TITLE: **PROGRAM FOR PRE-COLLEGE CENTERS CURRICULUM RESOURCES GROUP, CRG**

B. PROJECT DIRECTOR: Professor Herman Branson, Head, Department of Physics, Howard University, Washington, D. C. 20001. Tel: 202-387-8515.

C. PROJECT HEADQUARTERS:
a. Address: Program for Pre-College Centers, Curriculum Resources Group, Institute for Services to Education, 55 Chapel St., Newton, Mass. 02160. Tel: 617-969-4615. Contact Mrs. Emily Morrison.
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: William L. Barclay III, Mathematics Editor; Charles Haynie, Resident Mathematics Editor. Mathematics Editorial Committee: Lee Evans; Newcomb Greenleaf; Philip Morrison; William J. Nicholson; Lee Osburn; Walter R. Talbot. Also staff in English: Lawrence Langer, English Editor; Joan Murrell, Resident English Editor.

E. PROJECT SUPPORT:
a. Organizational sponsorship: Institute for Services to Education, 2000 P Street, N. W., Washington, D. C. 20001.
b. Funding agencies: Carnegie Corporation of New York; U. S. Office of Education; Office of Economic Opportunity.

F. PROJECT HISTORY:
a. Principal originators: Herman Branson, Ad Hoc Committee on Education in Predominantly Negro Colleges of American Council on Education.
b. Date and place of initiation: April, 1964. Massachusetts Institute of Technology.
c. Reason for initiation: Preparation of materials in English and mathematics to be used with Negro students in the South, beginning in the last year of high school, to improve their chances for success in college. This was intended as part of a program of assistance to predominantly Negro colleges.

G. PRESENT COMMERCIAL AFFILIATIONS: Conducting preliminary inquiries with commercial publishers.

H. PURPOSES AND SPECIFIC OBJECTIVES: The Pre-College Program is a unique design in inductive learning for the high school student from a family of low or modest income. It is a program in which the student is not "taught"; he is provoked to learn. It seeks to make him a full participant in all his classwork, to allow him--rather than his teachers--to become responsible for his education.

The math class, free from the pressure to cover a prescribed curriculum, offers the student an opportunity to try activities and investigations that will lead him to ask questions, and help him to discover on his own the underlying relationships and fundamental concepts of various mathematical areas. The emphasis in the classroom, therefore, is on exploration, invention, and the hunch. There is a style of teaching that is intimately connected with this approach to mathematical learning. It looks to the responses of the student for the direction and progress of the class. It is a style in which the teacher understands the general structure and logic of the subject, and is aware of many of the alternative pathways within this framework; but in which the students choose the actual course of the inquiry.

Mathematics is interpreted rather broadly as quantitative thinking, and some excursions have been made into the natural sciences. These will be extended.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics and science, high school level.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

Mathematics (as of 1/31/67)

1. Transformation on a Line
2. Surface Area
3. Computer Programming
4. Paper Computing Machines

English (as of 1/31/67)

5. To Kill a Mandarin
6. Picasso
7. An Approach to Style

K. MATERIALS AVAILABLE FREE: Brochure.

L. MATERIALS PURCHASABLE: Above pamphlets presently available at 75 cents apiece. More will be prepared soon, in both mathematics and science.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None described.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Nearly 100 teachers at various Upward Bound centers and in a few high schools.

b. Some specific schools where course is being taught: Upward Bound centers at Dillard University, Howard University, Fisk University, Morehouse College, Texas Southern University, Webster College. Has also been used at other Upward Bound centers, including Bowdoin College, Wesleyan University and Tufts University.

P. MATERIALS PRESENTLY BEING DEVELOPED:

8. Crazy Dice
9. The 1 to 20 Counting Game
10. Empirically Derived Functions
11. Geometry with Wax Paper
12. Map Coloring
13. Scoreboard Function
14. Pythagorean Theorem
15. Sieves and Primes
16. Polygons and Symmetries
17. Associated Numbers
18. Informal Geometry
19. An Extension of Symmetry Patterns Toward Group Theory
20. Classroom Use of Tic-Tac-Toe
21. Empirically Derived Graphs
22. A Chain Loop Puzzle
23. Relativity
24. Batteries and Switches

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Teacher orientation sessions, with demonstration classes and discussions are held twice a year at the centers using materials.

R. PROJECT EVALUATION:

a. Instruments used: The Evaluation staff has prepared its own instruments.

b. Control groups: Yes

c. Feedback process: Questionnaires are sent with each of the units to the teachers using the materials; also consultants visit the centers to discuss the use of materials with teachers.

d. Behavioral objectives identified: To determine whether the program as a whole has a long-term effect upon the students' education and vocational choices and achievements.

e. Research evidence of objectives achieved: Of the first group of students approximately 80 per cent enrolled in college, and only 12 per cent of these dropped out during their freshman year, less than half the dropout rate revealed in earlier studies of such colleges.

f. Other pertinent information: A progress report is being prepared by the evaluation group.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE: Another writing conference is planned for the summer of 1967 to continue revising and evaluating the units already developed, to create new units in English and mathematics and to expand into the areas of Science and Humanities.

Additional units will be published in pamphlet form as they are prepared.

A. PROJECT TITLE: PSSC ADVANCED TOPICS PROGRAM

B. PROJECT DIRECTOR: Uri Haber-Schaim, Educational Services Incorporated, 55 Chapel Street, Newton, Mass. 02160 Tel: 617-969-7100

C. PROJECT HEADQUARTERS:
   a. Address: Same as B. Contact Advanced Topics Program.
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: A number of persons have worked on the project over a period of years. Acknowledgments are given in the preface to the text.

E. PROJECT SUPPORT:
   a. Organizational sponsorship: Educational Services Incorporated
   b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
   a. Principal originator: None listed
   b. Date and place of initiation: 1962, Educational Services Incorporated.
   c. Reason for initiation: The Advanced Topics Supplement to the PSSC course takes up additional fundamental ideas and is meant to serve as an extension of the PSSC course into a three-semester or two-year course in high school or to be used as part of an introductory course in college.

G. PRESENT COMMERCIAL AFFILIATIONS: D. C. Heath and Company, 285 Columbus Ave., Boston, Mass.; Macalaster Scientific Corporation, 60 Arsenal St., Watertown, Mass. 02172; Science Electronics, 1085 Commonwealth Ave., Boston, Mass. 02215; Modern Learning Aids, 1212 Avenue of the Americas, New York, N. Y. 10036

H. PURPOSES AND SPECIFIC OBJECTIVES: The Advanced Topics Supplement takes up additional fundamental ideas and is meant to serve as an extension of the PSSC course into a three-semester or two-year course in high school or to be used as part of an introductory course in college.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Angular momentum, statistical mechanics, special relativity and quantum physics for use in high school or an introductory college course.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Text: Chapters 1-7, including Laboratory Guide.
   2. Teacher's Guide: corresponds to chapters 1-7 of text.
   3. Laboratory apparatus.
   4. Films: "Angular Momentum, A Vector Quantity," "Time Dilation," "Ultimate Speed," and "Electron-Positron Annihilation."

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE:
   1. $3.68 - D. C. Heath and Company, 285 Columbus Ave., Boston, Mass. 02116
   2. $3.68 - D. C. Heath and Company, 285 Columbus Ave., Boston, Mass. 02116

3. Prices vary - Macalaster Scientific Corporation, 60 Arsenal St., Watertown, Mass. 02172 OR Science Electronics, 1085 Commonwealth Ave., Boston, Mass. 02215

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None, at present

O. USE OF PROJECT MATERIALS: Not available

P. MATERIALS PRESENTLY BEING DEVELOPED: 5. Achievement Tests for all chapters.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: No specific plans. In the past various NSF-sponsored Summer Institutes have been offered.

R. PROJECT EVALUATION:
a. Instruments used: Teacher's feedback and feedback from Achievement tests.
b. Control groups: None
c. Feedback process: Pilot teachers have submitted regular written comments on all aspects of the course--text, laboratory, equipment, teacher's guide material, etc. The reports have been carefully reviewed and used as the basis for the revision of the Advanced Topics.
d. Behavioral objectives identified: No
e. Research evidence of objectives achieved: Feedback from teachers and results of achievement tests.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Work continued on preparation of the Teacher's Guide, which is now in print. Work began on preparation of Achievement Tests and gathering of feedback from the tests. This work is continuing.

T. PLANS FOR THE FUTURE: We expect to complete work on Achievement Tests and phase out the project.

A. PROJECT TITLE: RADIOISOTOPES AND INQUIRY

B. PROJECT DIRECTOR: J. L. Rips, Vice-President, Bio-Atomic Research Foundation, 12020 Chandler Boulevard, North Hollywood, Calif., Tel. 213-766-3926, 213-877-0993

C. PROJECT HEADQUARTERS: See "B" above.

D. PRINCIPAL PROFESSIONAL STAFF: Alan Keltz, Technical Consultant; Simon Kinsman, Technical Consultant; Benedict Cassen, Technical Consultant; Norman Faber, Group Director; Albert V. Mayrhofer, Group Director; Harry Couzins, Group Director

E. PROJECT SUPPORT: U. S. Atomic Energy Commission

F. PROJECT HISTORY:
a. Principal originators: J. L. Rips, Victor Aleck, Alan Keltz, John R. Rowe (Dec.)
b. Date and place of initiation: North Hollywood, Calif.
c. Reason for initiation: Student and teacher interest in radioisotopic techniques as a supplementary learning and teaching tool.

G. PRESENT COMMERCIAL AFFILIATIONS: None listed

H. PURPOSES AND SPECIFIC OBJECTIVES: To prepare and evaluate by field trial:
1. Selected investigations and supplementary information aimed toward the utilization of radioisotopes and radioisotopic techniques as investigative tools in the high school classroom.
2. A supplementary publication for use by teachers in connection with "1" above.
Intended as a supplement to existing biology curricula, correlation with 15 most commonly used texts.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Biology, Grades 10 thru 12

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Student text
2. Teacher commentary

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: Present intention is to arrange for commercial publication and distribution.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: 32
b. Some specific schools where course is being taught: Redlands High School, Redlands, Calif.; Alemany High School, Mission Hills, Calif.; Loara High School, Anaheim, Calif.; Hillsdale High School, San Mateo, Calif.; Pacific High School, San Leandro, Calif.; Modesto High School, Modesto, Calif.

P. MATERIALS PRESENTLY BEING DEVELOPED: None described

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Under development

R. PROJECT EVALUATION:

a. Instruments used: None described

b. Control groups: None

c. Feedback process: Teacher written report on each investigation following performance; teacher conference reports; student informal report on each investigation performed; student informal examination observations; reports of in-situ observations.

d. Behavioral objectives identified: These are now being identified and will be evaluated as a corollary project to the present effort.

e. Research evidence of objectives achieved: Student and teacher response to classroom use of subject material.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Writing conference - UCLA - Summer 1966; Publication of interim text and commentary; Distribution of texts for expanded classroom tryout.

T. PLANS FOR THE FUTURE: Refinement and publication of text material; Identification and evaluation of behavioral objectives; Introduction of material into summer institute teacher-training.

A. PROJECT TITLE: THE REORGANIZED SCIENCE CURRICULUM, KINDERGARTEN THROUGH GRADE TWELVE OF THE MINNEAPOLIS PUBLIC SCHOOLS. (MINNEAPOLIS REORGANIZED SCIENCE CURRICULUM)

B. PROJECT DIRECTOR: Dr. J. Hervey Shutts, 807 N. E. Broadway, Minneapolis, Minn. 55413. Tel: 612-332-4284, X344 or 345.

C. PROJECT HEADQUARTERS:
a. Address: Same as B. Contact Project Director.
b. Facilities available for viewing: K-12 classroom observations in the Minneapolis Public Schools.

D. PRINCIPAL PROFESSIONAL STAFF: Joseph L. Premo, Consultant in Science, Elementary.

E. PROJECT SUPPORT: Minneapolis Public Schools, Special School District No. 1, Minneapolis, Minn.

F. PROJECT HISTORY:
a. Principal originator: The Curriculum Coordinating Council of the Minneapolis Public Schools - requested by K-12 classroom teachers of science.
b. Date and place of initiation: 1955, Minneapolis Public Schools.
c. Reason for initiation: The need for the development of an integrated K-12 science curriculum for the minneapolis Public Schools.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The reorganization of the former science curriculum into an integrated science curriculum, kindergarten through grade twelve, with classroom teacher resource materials and evaluative tools.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: The science content to be taught to the pupils in the public elementary and secondary schools of Minneapolis, Minn.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. K-12 Overview	1961	7. Grade 4 Supplement	1965
2. K-12 Handbook	1961	8. Grade 5 Supplement	1964
3. Kg. Supplement	1962	9. Grade 6 Supplement	1964
4. Grade 1 Supplement	1962	10. Grade 7 Supplement	1966
5. Grade 2 Supplement	1962	11. Grade 8 Supplement	1966
6. Grade 3 Supplement	1962	12. Grade 9 Supplement	1966
		13. Grade 10 Supplement	1966

14. A testing program is in the process of being developed which will be an instrument which is diagnostic and also will measure achievement.
15. The Development of the Reorganized Science Curriculum in the Minneapolis Public Schools.
16. "Summary of Grade-Content Assignments".

K. MATERIALS AVAILABLE FREE: Nos. 15 and 16, from the Project Director - see "B".

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 1356 elementary teachers; 142 secondary teachers.

b. Some specific schools where course is being taught: None outside of the Minneapolis Public Schools.

P. MATERIALS PRESENTLY BEING DEVELOPED:

17. Additional material for Nos. 10, 11 and 12.
18. Constant up-dating of supplement materials for Nos. 3-13.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Elementary science teacher's workshops for classroom teachers who desire assistance on Saturday mornings and in specific buildings at all grade levels when requested. Secondary Science teachers in regular monthly in-service meetings.

R. PROJECT EVALUATION:

a. Instruments used: Being developed.

b. Control groups: None.

c. Feedback process: Teachers in training sessions react to procedures and request additional help, from the consultants in their classrooms.

d. Behavioral objectives identified: A few.

e. Research evidence of objectives achieved: None.

f. Other pertinent information: Pupil participation in learning activities is gradually being used by teachers. Until a battery of evaluation tools have been developed, no further work on this item can be carried on.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: During the past year the instructional film lists, the filmstrip lists, and the equipment lists have been up-dated. Classroom teachers continue to evaluate resource materials of all kinds at specific grade levels for the units to be taught. The junior high general science and the senior high biology supplements have been completed.

T. PLANS FOR THE FUTURE: The classroom teachers are continually requesting the writing of more resource units at each grade level. When money is available classroom teachers will be brought in on Saturdays and during vacations for this work. We hope to locate the necessary funds during this testing program. These evaluative tools will be developed by classroom teachers under the supervision of a competent consultant staff. It is anticipated that when funds and time are available, many of these materials will be put into printed form.

A. PROJECT TITLE: THE SAN ANTONIO LANGUAGE RESEARCH PROJECT FOR DISADVANTAGED SPANISH-SPEAKING CHILDREN

B. PROJECT DIRECTOR: Dr. Thomas D. Horn, Chairman, Department of Curriculum and Instruction, Sutton Hall 110, The University of Texas, Austin, Tex. 78712, Tel. 512-GR 1-5942

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above.
b. Facilities available for viewing: Two experimental language groups for developing facility in English as a second language, and improving facility in the native Spanish, using AAAS Process Approach as the content vehicle. A control group was instructed in the science material, but without the language emphasis factor.

D. PRINCIPAL PROFESSIONAL STAFF: Thomas D. Horn, Director; Raymond Arnold, Asst. Supt., Elementary, San Antonio Schools, Associate Director; Elizabeth Ott, Prof. Director, Language Education, Southwest Educational Development Laboratory, Associate Director; Richard Arnold, Reading-Study Center, The University of Texas, Asst. Director; Clyde Martin, Glenn McGlathery, Content Consultants; Anne O. Stemmler, Reading Consultant; Elizabeth Ott, English Language Consultant; Albar Pena, Spanish Language Consultant; Alma Gregory, Hercilia Toscano, Multi-School Deminstration Teachers.

E. PROJECT SUPPORT:
a. Organizational sponsorships: San Antonio Independent School District; The University of Texas
b. Funding agencies: Major Source: San Antonio Independent School District, Title I; Supporting Fund: Research and Development Center, The University of Texas

F. PROJECT HISTORY:
a. Principal originator: Dr. Thomas D. Horn
b. Date and place of initiation: August 1964; San Antonio, Tex.
c. Reason for initiation: The tremendous rate of failure and dropout of Spanish-speaking beginners in the public schools of Texas (approx. 80%) drew the attention and interest of the Director. Consequently, in 1964 he initiated as a part of the 27 National OE Cooperative Research Branch Studies in Beginning Reading, a study to determine the effectiveness of oral language development prior to formal instruction in reading. AAAS Science, A Process Approach, was selected as the content of the program.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To establish facility in the use of oral English prior to formalized instruction in reading and writing; to determine the effect of instruction in the native language (Spanish) on the learning of English as a second language and cognitive development (sociological and psychological impact is implicit in the general learning situation); and to test the effectiveness of content which is heavily loaded in meaningful concepts developed through concrete experiences inductively taught as evidenced by academic gains.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** 1964-65 Beginning 1st grade non-English speaking disadvantaged pupils N = 900; 1965-66 Original 1st graders now 2nd graders N = 675; 1966-67 Original 1st graders (1964) now 3rd graders N = 375; First graders (1965) now 2nd graders N = 400; Longitudinal Study planned to continue through 6th grade (1970-71)

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:** A portion of the content from Books K, 1, 2, and 3 was extracted and rewritten in terms of principles of language development. Specific vocabulary to be used in sentence structure patterns along with precise language teaching procedures were written in detail. The amount of such material makes it almost prohibitive to reproduce; however, a sample of the first topic in Book K is provided.

K. **MATERIALS AVAILABLE FREE:** Due to the extreme limitations of funds, there are no free materials.

L. **MATERIALS PURCHASABLE:** Supply of materials is limited to personnel directly involved in the Research Project. Certain key persons in positions of responsibility who are interested in obtaining these materials with the intention of application and usage should contact Dr. Horn for purchase arrangements.

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** English written for instruction as a second language; Spanish translation of the English lessons.

O. **USE OF PROJECT MATERIALS:**

a. Number of teachers using materials: In San Antonio Schools, N = 85 (1966-67); As a result of dissemination through 2 summer NDEA institutes for teachers, estimated total N = 250.

P. **MATERIALS PRESENTLY BEING DEVELOPED:** Specific Teaching Plans continue to be developed, using science content. Teacher's Manual, Part 4, is under translation in Spanish in preparation for the next year's program. The Language Component is under development for Part 4, English as a second language.

R. **PROJECT EVALUATION:**

a. Instruments used: AAAS Science-A Process Approach; Evaluative Measures; IPAT; (Several of which proved inappropriate): Goodenough-Harris Draw-A-Man Test; Inter-American Tests, English & Spanish (series); Brengelman-Manning, Linguistic Capacity Index; Metropolitan Readiness and Achievement Tests; Ott-Jameson Test of Fluency and Proficiency in English

b. Control groups: Since the primary focus of the study is language development using the content of science, those students receiving instruction in science without the language emphasis were controls in this respect.

c. Feedback process: As a result of regular and frequent classroom consultant service provided by the University of Texas staff, constant contact and information flow were maintained.

d. Behavioral objectives identified: The major general objective is for the pupil to develop the ability to use the English language with skill, clarity, and precision for receiving and expressing thoughts, feelings, and ideas in both academic and social situations. Specific objectives, however, are generally expressed in cognitive terms.

e. Research evidence of objectives achieved: Data from the Ott-Jameson Test indicates gains in the use of oral English highly significant for the English language emphasis groups. All groups showed significant gains in linguistic capacity as measured by the Brengelman-Manning Test.

f. Other pertinent information: Appropriate instruments remains the most crucial problem for assessing the effectiveness of the program. Teacher attitudes, an important factor for success, have not as yet been measured.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE; As a result of the findings of the research, certain modifications, e.g., a broadened curriculum base, administrative changes for facilitation, and an even stronger teacher-education program will be established. With these and other changes, the program will become a demonstration model for this geographic region.

A. PROJECT TITLE: SCHOOL MATHEMATICS CURRICULUM IMPROVEMENT STUDY

B. PROJECT DIRECTOR: Howard F. Fehr, Teachers College, Columbia University, New York, N.Y. 10027, Tel. 212-870-4420

C. PROJECT HEADQUARTERS:
a. Address: Teachers College, Columbia University, New York, N.Y. Tel. 212-870-4420, Contact: Project Director
b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Marshall H. Stone, University of Chicago; Vincent Haag, Franklin and Marshall College; Julius H. Hlavaty, Nat'l. Council of Teachers of Math.; Hans G. Steiner, University of Münster, Westfahlen, Germany.

E. PROJECT SUPPORT:
a. Organizational sponsorship: Department of Mathematical Education, Teachers College, Columbia University
b. Funding agencies: U. S. Office of Education; Teachers College, Columbia University

F. PROJECT HISTORY:
a. Principal originator: Howard F. Fehr
b. Date and place of initiation: September 1965, Teachers College, Columbia University
c. Reason for initiation: To develop a unified contemporary curriculum for grades 7 - 12, breaking down traditional separation of subjects.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To gain one to two years advance over present high school study for college-intending students

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics, Ages 12-18, Grades 7 - 12

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. A flow chart of the content of the curriculum, by years and categories
2. A textbook for the 1st year (grade 7) study
3. A teacher's guide to teaching the 1st course

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Not applicable

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: 20
b. Some specific schools where course is being taught: Hunter College High School, New York; Germantown Academy, Philadelphia; Southern Illinois University High School, Carbondale, Ill.

P. MATERIALS PRESENTLY BEING DEVELOPED: 4. 2nd course (grade 8) textbook and teacher training

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Professionalize Subject Matter Course (100 hr. of subject matter and Pedagogy); Modern structures of Mathematics; Teachers College, Columbia University, Dept. of Mathematical Education

R. PROJECT EVALUATION:

a. Instruments used: Our own tests

b. Control groups: None

c. Feedback process: Regular class visitation; regular meeting of all teachers involved with consultants; general test developed by the staff

d. Behavioral objectives identified: Yes, but not ready to be reported.

e. Research evidence of objectives achieved: Class visitation and a general test

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Planning Conference or Curriculum, June, 1966; Textbook writing and Teacher Training, Summer, 1966; Teaching experimental Textbook, Fall, 1966-Spring, 1967; Class observation and teacher conferences, Fall, 1966-Spring, 1967.

T. PLANS FOR THE FUTURE: Planning 8th grade curriculum, June, 1967; Writing Textbook for 8th grade, revising 7th grade-Summer, 1967; Training Teachers for 8th grade, Summer, 1967; Teaching, evaluating, research, Fall, 1967-Spring, 1968; The same for 8th and 9th grades, Spring-Summer, 1968.

A. PROJECT TITLE: SCHOOL MATHEMATICS STUDY GROUP (SMSG)

B. PROJECT DIRECTOR: Dr. E. G. Begle, SMSG - Cedar Hall, Stanford University, Stanford, Calif. 94305 Tel: 415-321-2300 X2912.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B. Contact Project Director.
   b. Facilities available for viewing: There are no facilities for visitors.

D. PRINCIPAL PROFESSIONAL STAFF: Leonard Cahen, Project Coordinator, National Longitudinal Study of Mathematical Abilities; James Wilson, Project Coordinator, Research and Analysis; Anneli Lax, Executive Editor, Monograph Project.

E. PROJECT SUPPORT:
   a. Organizational sponsorships: Stanford University and the Conference Board of the Mathematical Sciences.
   b. Funding agency: National Science Foundation.

F. PROJECT HISTORY:
   a. Principal originator: ad hoc Conference of Mathematicians.
   b. Date and place of initiation: March 1958, Yale University.
   c. Reason for initiation: To bring together classroom teachers and research mathematicians in a joint effort to improve the pre-college mathematics curriculum.

G. PRESENT COMMERCIAL AFFILIATIONS: The monograph series "New Mathematical Library" is published by Random House Inc., 457 Madison Ave., New York 22, N. Y. The filmed course for elementary school teachers is distributed by Modern Learning Aids, 3 East 54th St., New York 22, N. Y.

H. PURPOSES AND SPECIFIC OBJECTIVES: The primary purpose of the SMSG is to foster research and development in the teaching of school mathematics. The work of SMSG consists primarily in the development of courses, teaching materials and teaching methods. It is a part of SMSG's task, in cooperation with other mathematical organizations, to encourage exploration of the hypotheses underlying mathematics education.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics, kindergarten through grade 12; teacher training materials.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   Newsletters. Information concerning SMSG is disseminated through its Newsletters which appear at irregular intervals. Names are added to the mailing list for these Newsletters on request.

1. Organization, history and activities of SMSG
2. Minnesota National Laboratory reports
3. Teachers' reports on experimental units for grades 7 and 8
4. Progress report on the work of SMSG
5. In-service preparation of mathematics teachers
6. Progress report on the work of SMSG and order form
7. Publications available from Yale University Press
8. Announcement of the New Mathematical Library Series

9. Materials which should be ordered from SMSG
10. Reports on student achievement in SMSG courses
11. Future of SMSG, new projects and publications
12. In-service education program and announcement of textbooks
13. How texts are prepared and publications list
14. New Mathematical Library series in print and preparation
15. Reports on various SMSG projects
16. SMSG publications
17. Lists Supplementary Publications and selected list of inexpensive books for supplementary use
18. New SMSG publications
19. Report of a survey of in-service programs for mathematics teachers
20. SMSG publications
21. Reference guide to the New Mathematical Library - Description, Topical classification and Index with suggested grade levels
22. SMSG publications
23. Panel on Supplementary Publications
24. Reports of various SMSG projects
25. Articulation of Content of SMSG Tests, grades 7-10
26. Mathematics for the Elementary School - Book K, Teacher's Commentary
27. Book 1, Student's Text
28. Book 1, Teacher's Commentary
29. Book 2, Student's Text
30. Book 2, Teacher's Commentary
31. Book 3, Student's Text, Parts I and II
32. Book 3, Teacher's Commentary, Parts I and II
33. Grade 4, Student's Text, Parts I and II
34. Grade 4, Teacher's Commentary, Parts I and II
35. Grade 5, Student's Text, Parts I and II
36. Grade 5, Teacher's Commentary, Parts I and II
37. Grade 6, Student's Text, Parts I and II
38. Grade 6, Teacher's Commentary, Parts I and II
39. Mathematics for Junior High School - Volume I, Student's Text, Parts I and II
40. Volume I, Teacher's Commentary, Parts I and II
41. Volume II, Student's Text, Parts I and II
42. Volume II, Teacher's Commentary, Parts I and II
43. First Course in Algebra - Student's Text, Parts I and II
44. Teacher's Commentary, Parts I and II
45. Geometry - Student's Text, Parts I and II
46. Teacher's Commentary, Parts I and II
47. Geometry with Coordinates - Student's Text, Parts I and II
48. Teacher's Commentary, Parts I and II
49. Intermediate Mathematics - Student's Text, Parts I and II
50. Teacher's Commentary, Parts I and II
51. Elementary Functions - Student's Text
52. Teacher's Commentary
53. Introduction to Matrix Algebra - Student's Text
54. Teacher's Commentary
55. Introduction to Secondary School Mathematics - Volume I,

Student's Text, Parts I and II
56. Volume I, Teacher's Commentary
57. Volume II, Student's Text, Parts I and II
58. Volume II, Teacher's Commentary
59. Introduction to Algebra - Student's Text, Parts I and II
60. Teacher's Commentary, Parts I and II
61. Analytic Geometry - Student's Textbook
62. Teacher's Commentary

Programmed Material

63. Programmed First Course in Algebra (Form H) - Textbook, 2 parts, and Teacher's Commentary (one part)
64. Response Booklet
65. Calculus - Textbook, Parts I and II
66. Teacher's Commentary, Parts I and II
67. Textbook, Part III
68. Teacher's Commentary, Part III
69. Algorithms, Computation and Mathematics - Student's Text
70. Algorithms, Computation and Mathematics - Teacher's Commentary
71. Fortran - Student's Text
72. Fortran - Teacher's Commentary
73. Algol - Student's Text
74. Algol - Teacher's Commentary
75. Book K - Teacher's Commentary, Special Edition
76. Book 1, Parts I and II - Student's Text, Special Edition
77. Book 1, Parts I and II - Teacher's Commentary, Special Edition
78. SMSG: The Making of A Curriculum
79. Mathematics Through Science - Part I, Student's Text
80. Part I, Teacher's Commentary
81. Part II, Student's Text
82. Part II, Teacher's Commentary
83. Part III, Student's Text
84. Part III, Teacher's Commentary
85. Mathematics and Living Things - Student's Textbook
86. Teacher's Commentary
87. Junior High School Mathematics Units, Number Systems, Student's Text
88. Number Systems, Teacher's Commentary
89. Geometry, Student's Text
90. Geometry, Teacher's Commentary
91. Applications, Student's Text
92. Applications, Teacher's Commentary
93. Junior High School Supplementary Unit, Text
94. Junior High School Supplementary Unit, Commentary
95. Essays on Number Theory, I
96. Essays on Number Theory, II
97. Development of the Real Number System
98. Selected Units, Grade 4 (E-4150)
99. Probability for Primary Grades, Student Text
100. Probability for Primary Grades, Teacher's Commentary
101. Probability for Intermediate Grades, Student Text

102. Probability for Intermediate Grades, Teacher's Commentary
103. Introduction to Probability Part I - Basic Concepts, Student Text
104. Introduction to Probability Part 2, Special Topics, Student's Text

Supplementary and Enrichment Series

105. Functions, Student's Text
106. Circular Functions, Student's Text
107. Functions, Circular Functions, Teacher's Commentary
108. The Complex Number System, Student's Text
109. The Complex Number System, Teacher's Commentary
110. The System of Vectors, Student's Text
111. The System of Vectors, Teacher's Commentary
112. Non-Metric Geometry, Student's Text
113. Non-Metric Geometry, Teacher's Commentary
114. Plane Coordinate Geometry, Student's Text
115. Plane Coordinate Geometry, Teacher's Commentary
116. Inequalities, Student's Text
117. Inequalities, Teacher's Commentary
118. Numeration, Student's Text
119. Numeration, Teacher's Commentary
120. Algebraic Structures, Text and Answers
121. Factors and Primes, Student's Text
122. Factors and Primes, Teacher's Commentary
123. Mathematical Systems, Student's Text
124. Mathematical Systems, Teacher's Commentary
125. Systems of First Degree Equations in Three Variables, Student's Text
126. Systems of First Degree Equations in Three Variables, Teacher's Commentary
127. Radioactive Decay
128. Absolute Value, Student's Text
129. Absolute Value, Teacher's Commentary
130. Mathematical Theory of the Struggle for Life
131. 1 + 1 = ?

Reprint Series

132. The Structure of Algebra
133. Prime Numbers and Perfect Numbers
134. What is Contemporary Mathematics

Studies in Mathematics

135. Euclidean Geometry Based on Ruler and Protractor Axioms
136. Structure of Elementary Algebra
137. Geometry
138. Concepts of Informal Geometry
139. Number Systems
140. Intuitive Geometry
141. Concepts of Algebra
142. Brief Course in Math for Elementary School Teachers
143. Applied Mathematics in the High School
144. Mathematical Methods in Science
145. A Brief Course in Mathematics for Junior High School Teachers

146. In-service Course for Primary School Teachers
147. Introduction to Number Systems

Conference Reports

148. Elementary School Mathematics
149. Orientation Conference for SMSG Experimental Centers
150. Orientation Conference for SMSG Elementary School Experimental Centers
151. Orientation Conference for Geometry with Coordinates
152. Future Responsibilities for School Mathematics
153. Mathematics Education for Below Average Achievers

Study Guides in Mathematics

154. Study Guides in Mathematics (Volume includes Algebra, Calculus, Digital Computing and related mathematics, Geometry, Intermediate Mathematics, Number Theory, Probability and Statistics)
155. Very Short Course in Math for Parents
156. Philosophies and Procedures of SMSG Writing Teams

Spanish

157. Mathematicas Para El Primer Ciclo Secundario, Text - 2 Parts, Volumen I
158. Mathematicas Para El Primer Ciclo Secundario, Comentario - 2 Parts, Volumen I
159. Mathematicas Para El Primer Ciclo Secundario, Text - 2 Parts, Volumen II
160. Mathematicas Para El Primer Ciclo Secundario, Comentario - 2 Parts, Volumen II
161. Mathematica Para La Escuela Secundaria, Primer Curso de Algebra, Text - 2 Parts
162. Mathematica Para La Escuela Secundaria, Primer Curso de Algebra, Comentario - 2 Parts
163. Mathematica Para La Escuela Secundaria, Geometria, Text - 2 Parts
164. Mathematica Para La Escuela Secundaria, Geometria, Comentario - 2 Parts
165. Mathematicas Para La Escuela Secundaria - Mathematica Intermedia, 2 Parts
166. Mathematicas Para La Escuela Secundaria, Funciones Elementales
167. Mathematicas Para La Escuela Secundaria, Introduccion Al Algebra De La Matrices
168. Mathematicas Para La Escuela Primaria, Grado 5, 2 Parts, Comentario
169. Mathematicas Para La Escuela Primaria, Grado 6, 2 Parts, Comentario
170. El Curso Conciso En Mathematicas Para Los Profesores De Escuela Primaria

Films. A series of 30 half-hour films constitute an in-service course for elementary school teachers. No. 142 above is the text for this course. These films are distributed by Modern Learning Aids, 3 East 54th Street, New York, N. Y. 10022.

K. MATERIALS AVAILABLE FREE: Newsletters Nos. 10, 14, 15, 17, 19, 21, 22, 23, 24, and 25; Report No. 1 - The Programmed Learning Project; Report No. 2 - The Special Curriculum Project: Pilot Program on Mathematics Learning of Culturally Disadvantaged Primary School Children. Available on request from SMSG headquarters.

L. MATERIALS PURCHASABLE: Prices subject to change. See Newsletter No. 26, April, 1967.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Spanish, Swedish, Turkish, Chinese, and Portuguese.

O. USE OF PROJECT MATERIALS: Specific information is not available. Approximately 2 million students used SMSG materials in the 1966-67 academic year.

P. MATERIALS PRESENTLY BEING DEVELOPED: Text materials at the Junior High School level. These are solely for experimental use and will not be available until the conclusion of the experimentation.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None, except for the preparation of materials useful in in-service teacher training programs.

R. PROJECT EVALUATION:

a. Instruments used: For the most part specially constructed tests although a few standardized tests have been used.

b. Control groups: Yes.

c. Feedback process: A series of reports will be published.

d. Behavioral objectives identified: Solving specially selected mathematical problems.

e. Research evidence of objectives achieved: Analysis of data has not been completed.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The computing text and some units in probability for Elementary and Junior high school were completed and an outline of a new experimental sequence for Junior high school was prepared.

T. PLANS FOR THE FUTURE: Experimentation with a new junior high school sequence will start in September of 1967.

A. PROJECT TITLE: SCHOOL SCIENCE CURRICULUM PROJECT (SSCP)

B. PROJECT DIRECTOR: Richard F. P. Salinger, 805 West Pennsylvania Avenue, University of Illinois, Urbana, Ill. 61801, Tel. 217-333-4230

C. PROJECT HEADQUARTERS:

a. Adress: 805 West Pennsylvania Avenue, University of Illinois, Urbana, Illinois 61801, Tel. 217-333-4230, Contact: Richard F. P. Salinger, Director

b. Facilities available for viewing: Upon request, arrangements may be made to tour SSCP

D. PRINCIPAL PROFESSIONAL STAFF: Richard F. P. Salinger, Research Assistant Professor (Director); Associate Professors: Jack Easley, Peter Shoresman; Assistant Professor: Charles Weller; Research Assistant Professor: Brian Carss; Senior Research Engineer: Dominic O. Skaperdas, Coordinated Science Lab.; Research Associates: Rose Bourgin, Bernard Dodds, George Frost, Frine Jimenez, Jean Nance, Virginia Stolpe, Craig Vetter; Assistant Specialists in Education: Marianne Haney, Marilynn Phillips, William H. Schmidt; Research Assistants: Virginia Finlay, Charles Huth, David Monk, Catherine Ryan, Calvin Sumsion

E. PROJECT SUPPORT:

a. Organizational sponsorship: University of Illinois, Department of Secondary and Continuing Education

b. Funding agency: National Science Foundation

F. PROJECT HISTORY:

a. Principal originator: Gilbert C. Finlay (deceased), Professor of Education, University of Illinois.

b. Date and place of initiation: June 1963, University of Illinois, Urbana, Ill.

c. Reason for initiation: To develop improved science materials for Elementary and Junior High Schools.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The Project is working on the design of science curricula, 4-9, and on the development of specific teaching materials. Work on both objectives proceeds concurrently although, as yet, not uniformly in all fields. Small groups of scientists and teachers sketch out tentative guidelines and prepare whatever preliminary materials seem indicated--written material, apparatus, film strip, film loop, and the like. These are tried out with local classes and with small informal groups of children. The results of try-out are observed directly and, along with broader criticism, provide the basis for revision and extension. The Project puts its materials through several revisions before they are released for general use.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Science, broadly interpreted. Upper elementary and junior high school.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Running Water and River Development (use of literal model to interpret nature) 5-8
2. Beans and Biology (a study of Heterotrophic Life) 6-9
3. Motion, Photographs, and Pendulums (relative motion, frames of reference, evaluation of assumptions) 4-6.
4. Short Interval Timer (apparatus paper describing construction, theory, and application) no limit to grade level.
5. The Construction of Fifty-Gallon and Thirty-Gallon Aquariums (apparatus paper describing construction and application) no limit to grade level
6. Hatchet Planimeter (an apparatus designed to measure irregular shapes) no limit to grade level.
7. Pendulum (an apparatus paper describing construction and application of a model Foucault Pendulum) no limit to grade level.

K. MATERIALS AVAILABLE FREE: None. Materials available to trial center teachers only; special requests will be filled if adequate materials are available.

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGE INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Beans and Biology is being translated into Flemish by the National Belgian Association for Biology Teachers, in Tongeren, Belgian, for supervised use in Belgian Primary Schools.

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: Approximately 35
b. Some specific schools where course is being taught: Junior High School, Summit, N. J.; Bethany School, Cincinnati, O.; Mt. Tabor, Portland, Ore.; Spring Mill, Layfette Hills, Pa.; Alder Crest, Seattle, Wash.; John F. Kennedy Junior High School, Clearwater, Fla.; Central School, Sterling, Ill.; Lincoln Elementary School, Lakewood, O.; Walnut Heights, Walnut Creek, Calif.; Old Greenwich Elementary School, Greenwich, Conn.; Old Mill Lane, Wilmington, Del.; Benjamin Franklin Junior High School, Aurora, Ill.; Franklin Junior High School, Champaign, Ill.; Central, Metropolis, Ill.; Tilton Grade, Tilton, Ill.; Westwood School, Napa, Calif.

P. MATERIALS PRESENTLY BEING DEVELOPED:
8. Control-Feedback
9. Planaria
10. From Chick to Chick
11. Ninsect Game
12. Classification
13. Running Water Aquarium
14. Drosophila
15. Flies
16. Ferns and Mosses
17. Matter and Electricity
18. Writing Systems
19. Autolab

20. Snail Island
21. "Why is a Ninsect"
22. Fresh Water Aquarium
23. Energy
24. A Little Arithmetic with Your Science
25. Densitometer
26. Constructing Weights
27. Hand Microtome
28. Incubator
29. Oxygen Blue Bottle
30. Humidity Sensor

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Limited use of materials in some classes of "science for elementary teachers" at the University of Illinois. Program to be expanded on basis of earlier success.

R. PROJECT EVALUATION:

a. Instruments used: Tests on Understanding Science (TOUS), Interests and Ideas, and Time, Space, and Motion (all evaluation instruments designed for student response.)

b. Control groups: The first two tests indicated above have been administered to a number of different comparison groups.

c. Feedback process: Trials are made in selected classrooms by regular classroom teachers. Data from teacher-reaction sheets, analyses of entire taped class sessions, teacher tapes, and pre- and post-tests for children are collected. Testing is limited to a small test population in carefully selected test centers with which the Project maintains close contact. Materials are used in a few situations in which feedback arrangements are intensified. Resulting revisions are tried in more varied situations described above.

d. Behavioral objectives identified: Yes. Sets of specific behavioral objectives underlie two of the instruments listed under A above--Interests and Ideas and Questions About Time, Space and Motion. The first set of behavioral objectives relates to science instruction in general; the second set to the unit Motion, Photographs, and Pendulums.

e. Research evidence of objectives achieved: As of the date of the present report, objective test data from the 1965-66 evaluation program are still being processed and interpreted.

f. Other pertinent information: During the past year, Project staff has been working to develop and refine a new technique of item analysis. This technique involves the use of a "My Answer" option on five-alternative multiple-choice tests.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Project work has been concentrated on evaluation of existing materials and continued development of materials already in progress. No new work has been undertaken.

T. PLANS FOR THE FUTURE: SSCP's formal work will terminate in August, 1967. Hopefully, however, most of the teaching units and apparatus produced by the Project will be commercially available.

A. PROJECT TITLE: SCIENCE COURSES FOR BACCALAUREATE EDUCATION (INTRODUCTION TO NATURAL SCIENCE)

B. PROJECT DIRECTOR: Dr. V. L. Parsegian, Rensselaer Professor, Rensselaer Polytechnic Institute, Troy, N.Y. 12181, Tel. 518-270-6439

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above, Contact: Dr. V. L. Parsegian
b. Facilities available for viewing: Pilot classes at RPI (Troy); Russell Sage College (Troy); Finch College (New York City).

D. PRINCIPAL PROFESSIONAL STAFF: Alan Meltzer, Associate Professor of Physics, RPI; K. Scot Kinerson, Russell Sage College; Thomas Mendenhall, Finch College N.Y.; Harry Soodak, City College of N.Y.; Henry Margenau, Yale Univ.; (Many other participants).

E. PROJECT SUPPORT: Charles F. Kettering Foundation

F. PROJECT HISTORY:
a. Principal originator: Dr. V. L. Parsegian
b. Date and place of initiation: 1963; Rensselaer Polytechnic Institute
c. Reason for initiation: To develop an introduction to natural science which is suitable for all college level students.

G. PRESENT COMMERCIAL AFFILIATIONS: In process of selecting a publisher.

H. PURPOSES AND SPECIFIC OBJECTIVES: Systems, Feedback Concepts for Introduction to Natural Science.

An extensive multidisciplinary effort has been underway to devise a new approach for introducing college students to the historical, technical, conceptual, philosophical, and social significance of natural science. Supported by the Charles F. Kettering Foundation, the project is developing a two-year sequence comprising topics selected from mathematics, classical and atomic physics, earth science, astronomy, chemistry, biology, and social sciences. The new approach utilizes several themes to integrate and unify the topics, the most powerful of which are the concepts involving feedback and systems control.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Freshman and Sophomores at college level.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Text material in draft form being used by first and second year classes.
2. Progress Letters
3. See following articles on the project: A Science Course for Baccalaureate Education by V. L. Parsegian, Journal of Higher Education, 37, No. 5, May 1966; Baccalaureate Science, by V. L. Parsegian, Physics Today 20 (3), p. 57 (March 1967); Report on AAAS session, Science, 17 February 1967, p. 888.

K. MATERIALS AVAILABLE FREE: 2. Progress letters, by writing to Dr. V. L. Parsegian.

L. MATERIALS PURCHASABLE: None as yet.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No other contemplated.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: 5 classes at present; to be increased to about 12 during 1967-68.

b. Some specific schools where course is being taught: RPI (Troy) Russell Sage College (Troy, N.Y.) Finch College (N.Y. City) City College of New York

P. MATERIALS PRESENTLY BEING DEVELOPED:

4. A text for first year portion
5. A test for second year portion
6. A Laboratory Manual for the two years
7. A Teacher's Manual for both years
8. Lecture aids (transparencies, slides, short films)

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: A "Teaching Package" of Teachers Manual and lecture aids.

R. PROJECT EVALUATION:

a. Instruments used: Evaluation by the pilot class teachers

b. Control groups: Comparison by pilot class teachers with their conventional classes

c. Feedback process: Through "feedback committees" of the classes.

d. Behavioral objectives identified: No

e. Research evidence of objectives achieved: No formal instruments as yet.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Continued test of new course with more pilot classes.

T. PLANS FOR THE FUTURE: Published textbook for first year portion to be ready Spring 1968; Published textbook for second year portion to be ready Spring 1969; Laboratory Manual and Teaching Package ready in published form, Spring 1969; Ten to twelve pilot classes during 1967-68 will use mimeographed texts.

A. PROJECT TITLE: SCIENCE CURRICULUM IMPROVEMENT STUDY (SCIS)

B. PROJECT DIRECTOR: Robert Karplus

C. PROJECT HEADQUARTERS:

a. Address: Physics Department, University of California, Berkeley, Calif. 94720, Tel. 415-845-6000, X4541. General inquiries or requests for free materials should be sent to Newsletter editor; Specific problems or questions regarding project to Herbert Thier, Assistant Director.

b. Facilities available for viewing: The project will make arrangements for visitors to see its operations, talk with staff members, and attend classes where SCIS materials are being trial taught.

D. PRINCIPAL PROFESSIONAL STAFF: Robert Karplus, Director; Herbert D. Thier, Assistant Director; Chester A. Lawson, Director of Life Sciences; Luke E. Steiner, Director of Physical Sciences; Carl Berger, Physicist; Jane Bock, Senior Biologist; Joseph Davis, Chemist; James Eakin, Schools Coordinator; Sandra Fletcher, Junior Biologist; Christina Kageyama, Teacher; Erika Kunkel, Senior Biologist; Marshall Montgomery, Physicist; Harold Neuberger, Senior Biologist; Audrey Richards, Psychologist; Charlyn Sheehan, Teacher; Ellen Siegelman, Psychologist; Sid Strauss, Biologist and Educator; Laurence Malone, Junior Biologist; George Moynihan, Project coordinator; David Youngdahl, Director of Design; Trial Center Coordinators: Albert Carr, University of Hawaii, Honolulu, Hawaii; Stanford Davis, University of California, Los Angeles, Calif.; John Renner, University of Oklahoma, Norman, Okla.; Mary Budd Rowe, Teachers College, Columbia University, N.Y.; Director of Teacher Education: Willard Jacobson, Teachers College, Columbia University, New York.

E. PROJECT SUPPORT:

a. Organizational sponsorship: University of California, Berkeley

b. Funding Agency: National Science Foundation

F. PROJECT HISTORY: The Science Curriculum Improvement Study was established in the winter of 1962 by Robert Karplus, a professor of theoretical physics at the University of California, Berkeley as a result of his work with the Elementary School Science Project at that university. This experience had let Professor Karplus to the conclusion that elementary school science had not only to be simplified but organized on a drastically different basis from the usual logical subject-matter presentations to which the university scientist is accustomed.

G. PRESENT COMMERCIAL AFFILIATIONS: D. C. Heath and Company--preliminary commercial publication program

H. PURPOSES AND SPECIFIC OBJECTIVES: SCIS usually capsulizes its purposes as the development of scientific literacy. But it is important to delineate exactly what we mean by that term and how we hope to achieve this goal.

The most obvious meaning of scientific literacy is a sufficient knowledge and understanding of the fundamental concepts of both the biological and physical sciences for effective participation in twentieth century life. The role science plays in society is continually increasing in importance and will not be decided solely by the scientist but also by the non-scientist. To make wise decisions, the non-scientist will have to have an understanding of the real nature of science.

A second implication of scientific literacy is the development of a free and inquisitive attitude and the use of rational procedures for decision making. In the SCIS program, children learn science in an intellectually free atmosphere where their own ideas are respected, where they learn to test their ideas by experiment, and where they learn to accept or reject ideas, not on the basis of some authority but on the basis of empirical data. Hopefully, some of this experience will carry over to other areas of life and incline the children to make decisions on a more rational basis after weighing the factors, or evidence, involved more objectively.

How does SCIS go about achieving this goal? SCIS uses a materials-centered approach in which the elementary classroom actually becomes a laboratory. The children become acquainted with specific examples of objects and organisms, examine natural phenomena, and develop skills in manipulating and recording data. Selected materials are brought into the classroom. The children are allowed to manipulate or observe the material, sometimes freely in any way they wish and sometimes under the guidance of the teacher. As a result of these preliminary explorations, the children have a new experience--a direct physical and mental contact with the natural world.

As the next step, the teacher introduces the scientific concept that describes or explains what the children have observed. This is called the "invention" lesson. Following the invention lesson, other experiences are provided that present further examples of the concept. These are called "discovery" lessons. Through this procedure, the child is expected to recognize that the new concept has applications to situations other than the initial example. In other words, the discovery experiences reinforce, refine, and enlarge upon the content of the concept.

SCIS differs from other science curriculum projects in several respects. First, it is attempting to develop a complete and integrated curriculum rather than self-contained teaching units. Its teaching units are conceptually interdependent. Secondly, SCIS stresses concepts and phenomena with process learnings an implicit by-product of the children's experimentation, discussion, and analyses. Thirdly, SCIS uses classroom feedback throughout the development process of its units. When developing a unit, the staff first prepares a teaching plan and designs experiments. Then exploratory teaching by staff members takes place immediately and revisions are made on the basis of experience in the classroom. Then a trial edition of the unit is completed and it is taught in Berkeley area lab schools from one to two years. Further revisions are again made on the basis of classroom experience before the unit is published in a preliminary commercial version. This version is then taught in several trial centers across the United States from two to three years before further revision and final commercial publication.

I. SPECIFIC SUBJECTS AND GRADE LEVELS: Physical and life science curriculum for grades K-6. The program is actually sequential rather than graded.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Material Objects. The main objective of this unit is to teach the child to recognize material objects in his environment and to distinguish their properties. The first chapter introduces the child to the concepts of objects and properties and aims to develop careful habits of observation, the ability to discriminate fine differences and recognize broad similarities, and vocabulary useful in describing objects. The second chapter introduces the concept of material through the comparison and sorting of similarly shaped pieces of aluminum, brass, pine, walnut, and polystyrene. This concept is then applied in additional work with other woods and metals, as well as with rocks, liquids, and gasses. In the third chapter, the child compares objects with respect to one property that exhibits quantitative variation and practices serial ordering. This introduces a semi-quantitative aspect to the child's comparison of objects. In the fourth chapter, the emphasis is on the child's acting upon objects. The child experiments with various materials (ice, lump sugar, rock candy) in order to change their form while retaining their identity. He tests whether objects float or sink in water and uses air to displace water from submerged containers. These experiments give the child opportunities to apply what he has learned about material objects and their properties and, at the same time, provide an informal introduction to the concept of systems, which is part of a later physical science unit in the SCIS program.

2. Organisms. Just as the goal of the biologist is to understand life, so the goal of the SCIS Life Science Program is to provide children with classroom and field experiences that will lead them to a better understanding of life. Life is not something that can easily be defined. But we do know that living organisms must be studied in relation to their environment. For that reason, the SCIS Life Science Program has been built around the concept of the ecosystem. In Organisms, a model of an ecosystem is presented in the form of an aquarium which serves as a focus for the classroom investigations of animals and plants living in a real environment. From their observations, questions, and experiments relating to the aquarium, the children achieve some level of understanding of some of the basic concepts that form the foundation of biology such as, birth, death, growth, reproduction, food chain, habitat, diversity of organisms, feeding, digesting, excreting, detritus, soil fertility, etc. In addition to observing aquaria, the children plant various common garden seeds and observe germination and growth of plants.

3. Interaction. The Interaction unit is intended to follow Material Objects. It consists of a review section followed by five major parts on systems, invention and discovery of interaction, chemical interaction, interaction-at-a-distance, and electric circuits. Since modern science explains all happenings with reference to systems of interacting objects, it is important for children to have a clear understanding of the concepts of systems and interaction and the close relationship they have to each other.

"System" refers to a group of objects that is mentally separated from everything else so that their relations may receive special attention. Groups of objects may be created by putting together separate and distinct objects. They may jointly participate in a natural phenomenon, as do the sun and planets which form the Solar System, or they may be combined into a pattern such as small pieces of tile that are used to make a mosaic. The system is treated as a unit for some specific purpose of experimentation or manipulation and has properties not possessed by the individual objects which make it up. The system retains its identity even if its parts are rearranged or altered so long as nothing is added or removed. The systems concept is introduced to primary grade children who are going through the process of developing conservation logic so as to help them generalize their reasoning from the transformations they have mastered to those they have not yet understood. This concept also enables children to name and thereby discuss experimental setups and other entities that have no common name. Further the selection of systems helps children to focus their attention and organize the information received through their senses.

The "interaction" concept is being used more and more widely to explain social and scientific phenomena. To say that objects interact is to say that they are in a relationship whereby they jointly produce an effect, which is the result of their action upon each other. Through manipulation of object combinations (systems), the children's attention is focused upon the changes that take place when simple operations are performed with the objects. The idea that changes result from an interaction is demonstrated with several simple experiments. Interaction-at-a distance examples show that physical contact between interacting objects is not always necessary. The unit also contains opportunities to investigate examples of thermal, magnetic, and electric interactions. The interaction concept helps children see the relationship among objects that are involved in a phenomenon and makes it easier for them to leave behind the earlier stages in which they appeal to mere descriptions, final outcomes, mysterious agents, or innate powers to explain events.

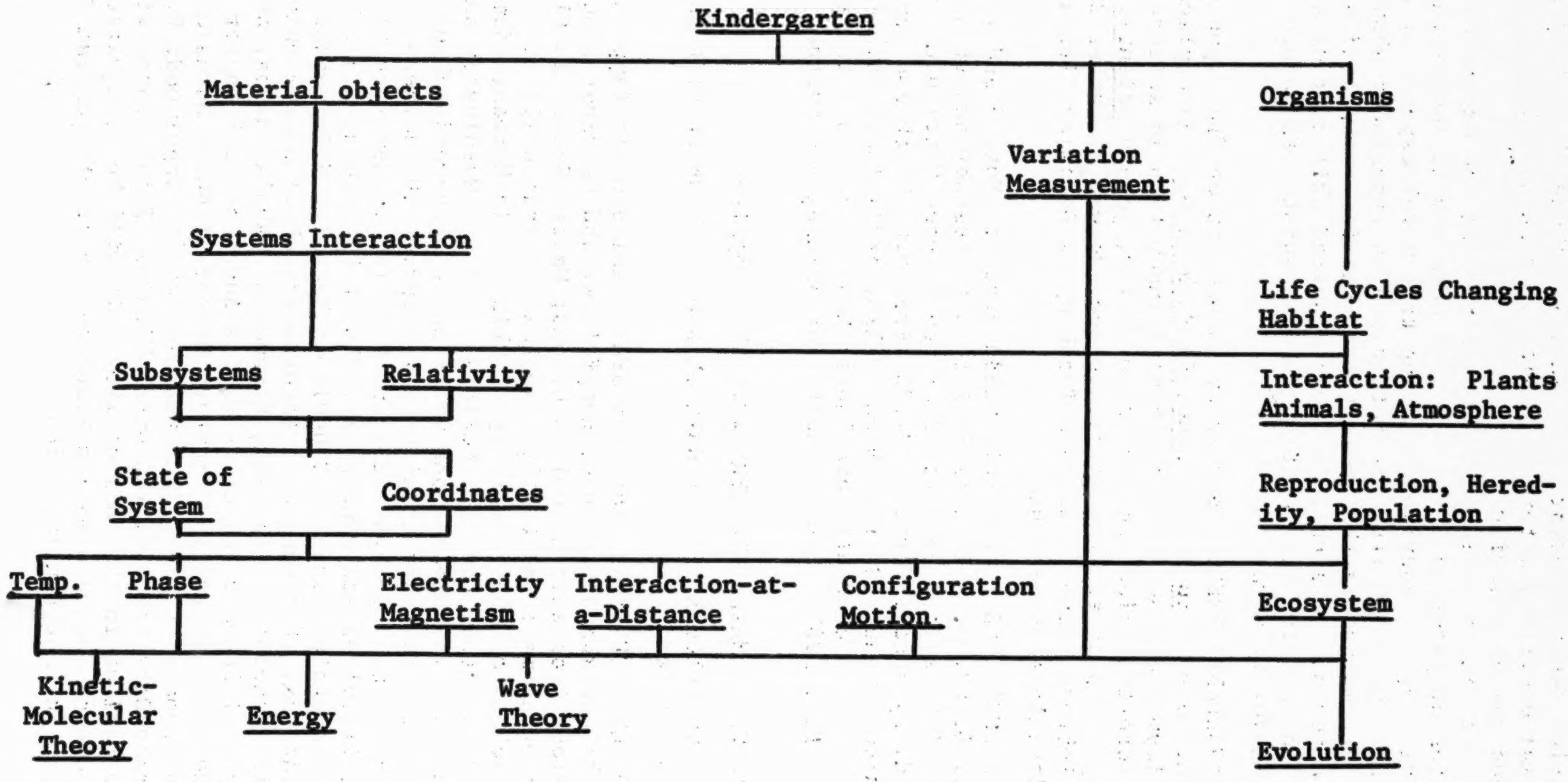
4. Measurement. The activities of Measurement give the children an opportunity to observe objects in a more analytical way and introduce them to the concept of standard units of measurement. At the same time, they will apply and reinforce their understanding of properties introduced in Material Objects. In the first part of the unit, the children are given experiences with collecting and processing quantitative data in order to make predictions.

In other words, they learn to describe properties quantitatively. Then, the next two parts of the unit introduce the concepts of length and area and the need for using a standard unit to measure them. The activities give the children experience using various methods of measuring and thus lead them to see the value of standard units of measurement.

5. Subsystems. The concept of subsystems is an extension of the systems concept. There are times when one deals with a system in an experiment but one's attention is really focused on only one part of the system--that is, a subsystem. As children become more aware of the complexity of phenomena in their environment, they will find their attention drawn simultaneously to different groups of objects. The subsystems concept will enable them to deal with this problem by first choosing a fairly comprehensive system that includes all participating objects but then concentrating on one or more subsystems which can be studied in detail. In this unit, observation and manipulation of various liquid and solid mixtures lead to an introduction of the subsystems concept. Then the children apply the new concept to experiments with an electromagnet, to vaporization and condensation phenomena, to solutions of salt and water, and to mixtures of liquids and water.

6. Relativity. The qualitative work the pupils carry out in the Relativity unit enable them to understand better the full meaning of the theory of relativity at a later time. Essentially the meaning of relativity is that one must use reference objects or reference points to describe position and the changes in position called motion. Without the use of reference objects or reference points, the concepts of position have no meaning. Through the use of puzzles and game-like exercises, the concepts of position and motion are introduced. Position is considered relative to an observer as a reference frame or to other objects as environmental reference frames. To help the children consider problems of position and motion, SCIS has created an artificial observer called Mr. O who always describes the location of everything relative to himself. Coordinate systems, such as polar grids and protractors and rulers, serve to refine the determination of position for an object. Relative motion--change of position--is illustrated in film loops, pictorial analysis, and flip books.

7. Temperature. Temperature gives the child a new look at familiar phenomena. It enlarges his experiences with substances colder and warner than room temperature and leads him to make quantitative measurements. Although unfamiliar equipment and chemicals are introduced where needed, much of the work is done with common items, such as simple thermometers, hot and cold water, and ice cubes. The children learn how the thermometer works--how it measures the temperature of other objects. Largely through their own discovery, the children learn that water and some other substances have reproducible melting points and that objects at different temperatures tend to come to a common temperature when they are brought into contact with each other. In these experiments, the children begin to recognize differences in thermometers that result from thermometer error. The concept of thermal equilibrium helps the children


Kindergarten
Material objects
Variation Measurement
Organisms
Systems Interaction
Life Cycles Changing Habitat
Subsystems
Relativity
Interaction: Plants Animals, Atmosphere
State of System
Coordinates
Reproduction, Heredity, Population
Temp.
Phase
Electricity Magnetism
Interaction-at-a-Distance
Configuration Motion
Ecosystem
Kinetic-Molecular Theory
Energy
Wave Theory
Evolution

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to summarize their observations. This knowledge about temperature and thermal equilibrium forms a basis for work in a later unit on energy and energy transfer.

Other activities include a demonstration of the expansion and contraction of gases, a discovery that common salt lowers the temperature of ice, an experiment showing that metal expands or contracts in response to its temperature and an experiment showing changes in temperature that result from chemical interaction. The final chapter uses the child's newly acquired skills of data keeping and 'thermometry' to identify unknown substances solely through their behavior when warmed.

K. MATERIALS AVAILABLE FREE: Newsletter (subscription free upon request) Chester A. Lawson, So Little Done, So Much to Do. An explanation for the layman of the rationale behind innovation in science curriculum; Robert Karplus and Herbert D. Thier, Toward Scientific Literacy. Reprinted from Education Age, Volume 2, Number 2, January-February, 1966, "Science Teaching is Becoming Literate." Other miscellaneous reprints.

L. MATERIALS PURCHASABLE: From SCIS headquarters: Nos. 5 and 7, $1.50 each; No. 6, $3.00. All units include both teacher and student manuals. Theoretical Background of the Science Curriculum Improvement Study by Robert Karplus, $1.00; From D.C. Heath and Company 285 Columbus Avenue, Boston, Mass. 02116, preliminary commercial versions: No. 1 currently available; Nos. 2, 3, and 4 to be available Fall 1967. Contact Heath for pricing and further information.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS: Berkeley area Trial Schools (approx. 45 teachers): Berkwood, LeConte, Longfellow, and Washington Schools in Berkeley; Clorietta School in Orinda; Madera School in El Cerrito; Oklahoma Trial Center: (approx. 35 teachers): the Laboratory School of the University of Oklahoma in Norman; Adams, Cleveland, Jackson, Loncoln, McKinley, Monroe, Washington and Wilson Schools in Norman; John Tyler and Rollingwood Schools in Oklahoma City; New York Trial Center (approx. 30 teachers): Agnes Russell School, P.S. 125, and P.S. 145 in New York City; Quarles, Cleveland and Lincoln Schools in Englewood, N.J.; Walter Stillman and Ralph Maughaum Schools in Tenafly, N.J.; Hawaii Trial Center (approx. 16 teachers): Laboratory School of the University of Hawaii, Honolulu; Aliiolani, Kashumanu, Kahala, Manoa, Noelani, and Maryknoll Schools in Honolulu; Los Angeles Trial Center (approx. 20 teachers: University Elementary School of UCLA; Burnside and Overland Schools, Los Angeles; Hudnall School, Ingelwood; Hesby and Sherman Oaks Schools, Van Nuys; Michigan Trial Center will begin operations in the fall of 1967. It will be headquartered at the Science and Mathematics Teaching Center of Michigan State University in East Lansing, Mich.

P. MATERIALS PRESENTLY BEING DEVELOPED:

8. Life Science Program: The second year program builds on the concepts of the first year and continues the investigation of the ecosystem. Various plants and animals are observed from the egg or seed stages to adulthood and the production of another generation of eggs or seeds. On the basis of these observations, the concept of the life cycle is introduced with its subconcepts of growth, development, and maturation. The idea of successive life cycles producing successive generations plus the observation that each adult pair produces many offspring leads to the concepts of biotic-potential and of population.

Investigation of the ecosystem will continue through the sixth grade with the program each year building on the experiences of the previous year. In the third year, the oxygen and carbon dioxide exchange between plants and animals will be emphasized. During the fourth grade, the concept of the life cycle will serve as a starting point for consideration of reproduction and heredity. This will necessitate the introduction of the cell concept, the use of simple microscopes, and breeding experiments with fruit flies. The relation of reproduction and heredity to the survival of populations will be stressed. The fifth year program will be concerned with microorganisms and their function within the total ecosystem. This will include the concepts of decomposition, soil fertility, and the carbon and nitrogen cycles. The major topic for the sixth year will be change within an ecosystem. This will include behavior experiments with organisms, succession in communities, and evolution.

9. Physical Science Program: Work is in progress on two new units. One, a unit on substances and phases, continues earlier work on properties of substances, their phase transitions--melting, crystallizing, dissolving, evaporating, and condensing--and it extends the children's experience begun in the Interaction unit with simple chemical interactions. The second new unit, one on thermal energy, continues the study begun in the Temperature unit of trends toward thermal equilibrium but this time in terms of a concept of energy transfer. In the unit, a study of thermal conduction and of heat capacity may help the children think about the intrinsic energies of substances. Some of the work in these units is quantitative.

Exploratory work is also in progress on coordinates, as an extension of the Relativity unit, and on electricity and magnetism. Activities in electricity lead to the concept of an electric circuit, to the circuit diagram, and to the idea of electric currents which can be measured by magnetic effects or electro-chemical effects. Units on fields and interaction-at-a-distance are projected. These could be concerned with magnetic, electrostatic, gravitational, optical and accoustical effects.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The SCIS Inservice Teacher Education Program consists of an inservice course taken by the teachers the year before they use the SCIS materials in their classrooms, an orientation conference held before the new materials are introduced into the classrooms, a continuing inservice consultative service, and an evaluation conference after the teachers have finished teaching one or more units of the SCIS program. A wide range of teacher education materials is being developed for use in the teacher education program, and a system of periodic evaluation of teacher education procedures and materials has been instituted.

New approaches to teacher education are developed and tested in the SCIS trial centers. The trial center coordinators, Albert Carr of the University of Hawaii, John Renner of the University of Oklahoma, Stanford Davis of the University of California at Los Angeles, and Mary Budd Rowe of Teachers College, Columbia University, each develop approaches to inservice education. These inservice programs are designed to help the elementary school teachers in the trial centers use the SCIS elementary science program more effectively. From these experiences in teacher education in the trial centers, we hope to develop teacher education materials and procedures that can be used in other teacher education programs.

A variety of methods and procedures are tried in the inservice programs in the trial centers. A sourcebook is being developed which will contain original papers on the theoretical, historical, and psychological foundations of the SCIS program. A number of original papers providing background information in areas of science and education closely related to the SCIS elementary science program are being prepared. A special section of the sourcebook will be devoted to professionalized laboratory experiences. Kits of the materials and equipment needed for this laboratory are also being developed. A series of documentary films showing teachers teaching lessons from the SCIS program have been filmed by Davidson Films of San Francisco, and films which orient teachers to various units of the SCIS program are being prepared. Teachers have also had opportunities to use SCIS materials with small groups of children, and some of these experiences have been videotaped so that teachers can analyze their own work. Records have been cut which describe and discuss the SCIS program and some of the considerations to be kept in mind in teaching SCIS materials. Slides, filmstrips, transparencies and other audiovisual materials are also planned.

The materials and procedures used in the SCIS Teacher Education Program are being evaluated in the trial centers. Both teachers and coordinators submit their reactions and make suggestions for additional materials, new teaching procedures, and different kinds of consultant help. Since time and experience change perspective, reactions and suggestions will be sought throughout the three year trial of the SCIS materials.

The procedures for developing and perfecting the SCIS Teacher Education Program are similar to those being used in developing the elementary science program. Procedures and materials are proposed, subjected to criticism, and tried out in exploratory teaching The materials and procedures then undergo more extensive testing in the trial centers. Eventually, it is hoped that a tested teacher education program with a variety of suggested procedures and effective materials will be available for use by teacher education institutions and school systems interested in the SCIS program.

The SCIS Teacher Education Program is under the direction of Dr. Willard Jacobson, Teachers College, Columbia University.

R. PROJECT EVALUATION (Feedback): SCIS prefers to talk about feedback rather than evaluation because the project does not mean to imply a definitive and absolute measurement of the scientific literacy of the pupils emerging from the SCIS program. Instead, we are concerned with assessing the impact of the program in such a way that teachers and curriculum designers can choose better strategies for teaching.

Herbert D. Thier, Assistant Director, is responsible for planning and supervising the feedback work. The construction of valid, reliable, and practical procedures that can be used routinely by the teacher for assessing student progress and that provide adequate data for studying the interaction of instructional and student variables are of central concern in the program. In addition, the development nature of the SCIS curriculum creates an obligation to study the cumulative impact of the proposed program, on the teachers, and on the total learning situation provided for students.

Comparisons between students who have had the experimental program and those who have not are of secondary importance. It is, however, important to make comparisons among students within the program. Since all students in the program are unlikely to achieve the goals and objectives of the program to the same degree, information is needed to understand the complex of variables that is associated with differences in achievement of students.

At present it is impossible to identify all of the devices that are needed in the collection of feedback; but it is possible to identify some of the tasks that are in the process of being accomplished. These are listed below.

The first task of the program is to identify and define operationally all of the objectives of the curriculum. This step requires cooperative effort on the part of the designers of the curriculum materials, the classroom teachers, and the feedback collectors. Attention is given not only to identifying and defining behavioral outcomes for the students, but also to identifying possible effects that the program might have on the total learning environment provided for the students. The developmental nature of the curriculum is considered and reflected in the definition of objectives. These objectives are listed in the various SCIS manuals.

The second task is to devise methods of assessing progress toward the achievement of the various objectives. Since the program begins at the first grade level and since the objectives of the program are so complex and varied, one cannot rely on paper-pencil devices. It has been necessary to construct devices that will provide valid and reliable evidence of the achievevement of major objectives. Appropriate methods of obtaining data on both cognitive and affective behavior of students, both within grades and across grades, must be developed. Since the teachers will be the ultimate user of these devices, the instruments developed must be not only valid and reliable but also practical to use in the classroom setting. Materials for the first grade program are being field tested in the various centers during 1966-67.

A third task is identifying the students, teacher, and school variables that are likely to help in the interpretation and use of the results of the feedback. For the student, the important variables are scholastic aptitude, socio-economic status, family background, and previous experience. For the teacher, the important variables are educational and experience background, attitude toward the program, and preparation for teaching the special curriculum. The school variables that we are most interested in are organization for instruction, consultant services, per pupil expenditure, and innovative enterprise of the school district.

A fourth major task is the analysis and interpretation of the data as they are obtained.

A fifth task is the inservice education of classroom teachers in collection of feedback. The classroom teacher must be able to assess student progress in order to make adjustments in the teaching-learning situation. This is a major activity of the teacher inservice education program described earlier.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Preliminary commercial version of Material Objects was published by D. C. Heath and Company. Preliminary commercial versions of Organisms, Measurement, and Interaction will become available in the fall of 1967. The first grade life science unit, Organisms, was produced and work on other life science units is in progress. Additional physical science units have been produced and exploratory work is continuing on the upper grade physical science program. Research and development has progressed on teacher education and feedback materials and programs.

T. PLANS FOR THE FUTURE: Preliminary commercial versions of units will become available for each grade level on the basis of approximately one grade a year. Work will continue on the development of additional units in both the life and physical sciences. Further development of teacher training and feedback programs is also planned.

The goal of development is an integrated program in teacher education and feedback testing which will provide the teacher with the necessary skills to teach the SCIS program and also the understanding, skill, and sensitivity needed to carry out the process and understand the value of the feedback testing program. It is expected that these materials will be developed in a form which makes them usable by the local school system.

A. PROJECT TITLE: SECONDARY SCHOOL SCIENCE PROJECT (SSSP), COURSE TITLE: "TIME, SPACE, AND MATTER" (TSM)

B. PROJECT DIRECTOR: George J. Pallrand, Secondary School Science Project, Princeton University, 171 Broadmead Avenue, Princeton, N. J. 08540, Tel. 609-452-4098

C. PROJECT HEADQUARTERS:

a. Address: Princeton University, 171 Broadmead Avenue, Princeton, N. J. 08540, Tel. 609-452-4098, 4126, 3594, 3595, 3596, 3597, 3598, Contact: Director, Secondary School Science Project

b. Facilities available for viewing: Display area, classes when in session, Princeton schools

D. PRINCIPAL PROFESSIONAL STAFF: Sheldon Judson, Principal Investigator; George J. Pallrand, Director; H. S. Holland, Science Advisor; Lois B. Arnold, Curriculum Analyst; Arnold M. Goldstein, Editor; Elaine Heinemann, Writer; Charles Kulick, Design-Development Specialist; Helen M. Markham, Professional Assistant; James F. Murphy, Administrator; Michael Piburn, Professional Associate

E. PROJECT SUPPORT: Princeton University, National Science Foundation

F. PROJECT HISTORY:

a. Principal originators: Frederick L. Ferris, Jr., George J. Pallrand

b. Date and place of initiation: April 1963, Princeton University, Princeton, N.J.

c. Reason for initiation: Reaction by University scientists to the traditional method of presenting science to secondary school students as a finished body of facts, communicable and understood by rote teaching and learning.

G. PRESENT COMMERCIAL AFFILIATIONS: Webster Division, McGraw-Hill Book Company, Manchester, Mo. 63011

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop a science curriculum for use at the secondary school level, flexible in structure, using no textbook, inclusive of all needed student, teacher, and classroom materials; to develop testing and evaluation measures, and to prepare training programs for teachers.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: The Physical Sciences (geology, astronomy, physics, chemistry, mathematics) Grades VIII - IX

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1.	Student Investigation Books	I - IX
2.	Teacher Folios	I - IX
3.	Science Reading Series	I - XV
4.	Course Description Book	I
5.	Records for the Teacher	I - V
6.	Progress Reports	I - V
7.	Student, Teacher, Classroom Equipment and Supplies	
8.	Tests (nonverbal)	

K. MATERIALS AVAILABLE FREE: 6. Progress Report V - Secondary School Science Project, 171 Broadmead Ave., Princeton University, Princeton, N. J. 08540; Publisher's Course Description Booklet - Webster Division, McGraw-Hill Book Co., Manchester, Mo. 63011

L. MATERIALS PURCHASABLE: For description, prices, examination packages, write Webster Division, McGraw-Hill Book Co., Manchester, Mo. 63011

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Unknown - Translation has project support

O. USE OF PROJECT MATERIALS:
  a. Number of teachers using materials: 750
  b. Some specific schools where course is being taught: Write Webster Division, McGraw-Hill Book Co., Manchester, Mo. 63011

P. MATERIALS PRESENTLY BEING DEVELOPED:
  9. Tests
  10. Science Reading Series XVI - XX
  11. Recordings for the Teacher VI - IX
  12. Course Overview Book
  13. Bibliography and Film list

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Write Webster Division, McGraw-Hill Book Co., Manchester, Mo. 63011

R. PROJECT EVALUATION: Evaluation of Trial versions completed during academic year 1966-67

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Evaluation of teaching of course materials to disadvantaged students conducted on Princeton campus, summer 1966; publisher's training program for new teachers tested on Princeton campus, summer 1966; nonverbal tests of learning ability administered in New Jersey Schools, April - June, 1966

T. PLANS FOR THE FUTURE: None described

A. PROJECT TITLE: SOCIAL STUDIES CURRICULUM PROGRAM, EDUCATIONAL SERVICES INCORPORATED (ESI)

B. PROJECT DIRECTOR: Dr. Lawrence H. Fuchs, ESI, 44-A Brattle Street, Cambridge, Mass. 02138, Tel. 617-354-3746

C. PROJECT HEADQUARTERS:
a. Address: Business office - 12 Mifflin Place, Cambridge, Mass. Administrative offices - 15 Mifflin Place, Cambridge; Working party offices - 44-A Brattle Street, Cambridge; For project information contact: Dr. Arleigh D. Richardson III, Executive Officer
b. Facilities available for viewing: Dr. Richardson and his staff will speak with visitors; our materials are available for inspection as well as several pamphlets describing the Social Studies Program.

D. PRINCIPAL PROFESSIONAL STAFF: Lawrence H. Fuchs, Director of the Program; Arleigh D. Richardson, Executive Officer; Peter Dow, Deputy Director; Duncan Yaggy, Assistant to the Director

E. PROJECT SUPPORT:
a. Organizational sponsorships: Massachusetts Institute of Technology; American Council of Learned Societies
b. Funding agencies: Ford Foundation, Carnegie Corporation, National Science Foundation

F. PROJECT HISTORY:
a. Principal originators: James R. Killian, MIT; Jerrold Zacharias, MIT; Elting E. Morison, MIT; Franklin Patterson, Tufts; Jerome S. Bruner, Harvard
b. Date and place of initiation: June 1962, MIT Endicott House
c. Reason for initiation: "...Called to explore possibilities of social studies curriculum revision, the meeting [in June 1962] was the creation of Jerrold Zacharias...[it was agreed] that the teaching of the general fields of social studies and the humanities was desperately in need of improvement in the elementary and secondary schools of this country..." A Short History of the Social Studies Program, Spring 1965

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To carry out research and development of social studies curricula, elementary through senior high; to produce new teaching materials, and to implement the teaching of this curricula.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Man: What is human about human beings? How did they get that way and how can they be made more so?; Man: The political being; the stages of political growth 'from subject to citizen'; attitudes toward power and political authority; Man: How he adapts to political situations; the American political institution today; the political experience of various national ethnic groups; Man: The effects of technology and science on society.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. "Queen Elizabeth: Conflict and Compromise"

2. "The Emergence of the American"
3. "The Negro in American Life"
4. "The Death of a Republic: A Study from Roman History"
5. "Man: A Course of Study"
6. "The Making of the American Revolution"

(All these produced in test editions; not available otherwise.)

K. MATERIALS AVAILABLE FREE: Occasional Papers, A Short History of the Program, Spring Report available from Dr. Richardson's office, 15 Mifflin, Cambridge.

L. MATERIALS PURCHASABLE: None at present. Target date for first materials--September 1968.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None, at present.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: approximately 100 during the 1966-67 academic year.

b. Some specific schools where course is being taught: Jefferso Avenue Junior High, Texarkana, Ark.; Miller Creek School, San Rafael, Calif.; Alameda Junior High, Denver, Colo.; Weeks Junior High, Newton, Mass.; North Carolina Advancement School, Winston-Salem, N.C.; Canberra Grammar School, Canberra, Australia

P. MATERIALS PRESENTLY BEING DEVELOPED: 7. Curriculum units on the Irish in America, the American Constitution, the English Civil War and the Glorious Revolution of 1688, and Greece.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Just commencing to grapple with this problem, since first priority was to produce new materials.

R. PROJECT EVALUATION:

a. Instruments used: Taped interviews with students, pre- and post-tests, etc., carried out by Dean K. Whitla, Director of Testing, Harvard University

b. Control groups: Yes

c. Feedback process: See "a" above.

d. Behavioral Objectives identified: Yes

e. Research evidence of objectives achieved: Incomplete until end of current academic year.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Completion of test editions "Death of Republic...", Queen Elizabeth...", "The Making of the American Revolution", "Man: A Course of Study Testing currently in schools.

T. PLANS FOR THE FUTURE: Due to some restructuring, impossible to define accurately at present.

A. PROJECT TITLE: SOCIOLOGICAL RESOURCES FOR SECONDARY SCHOOLS (SRSS)

B. PROJECT DIRECTOR: Robert C. Angell, Executive Director, 503 First National Building, Ann Arbor, Mich. 48108, Tel. 313-665-9147

C. PROJECT HEADQUARTERS:
   a. Address: Same as "B" above
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: Robert C. Angell, Executive Director; Everett K. Wilson, Sociologist in Chief; William M. Hering, Jr., Assistant Director for School Liaison; F. Lincoln Grahlfs, Supervisor of Evaluation; Thomas J. Switzer, Teacher-Designer; Corinne Janssens, Editor.

E. PROJECT SUPPORT:
   a. Organizational sponsorship: American Sociological Association
   b. Funding agency: National Science Foundation

F. PROJECT HISTORY:
   a. Principal originator: American Sociological Association, Committee on the Social Studies Curriculum of American Secondary Schools
   b. Date and place of initiation: October 1, 1964, Dartmouth College; Hanover, N.H.
   c. Reason for initiation: To improve sociological materials available for use in American secondary schools

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To produce forty short units of two-weeks teaching time each, suitable for inclusion in courses in problems of democracy, American history, world cultures, as well as sociology; to prepare a model sociology course, one semester in length; to produce a set of paperback books for supplementary reading, particularly in relation to courses in problems of democracy.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Our materials are designed for the eleventh and twelfth grades. Some of them might be suitable for the tenth grade.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: None

K. MATERIALS AVAILABLE FREE: None

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No plans for translation

O. USE OF PROJECT MATERIALS: None

P. MATERIALS PRESENTLY BEING DEVELOPED: We are loath to list the forty short units because we do not know which of them may be withdrawn after a national evaluation program is completed. It has not been decided what form the materials for the course will take. It will probably not be a single textbook.

The first paperback will be entitled Urbanism and will contain twelve to fifteen papers by sociologists that have been rewritten for high school students. Later paperbacks will be on such subjects as race relations, juvenile delinquency, and the population problem.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: We are planning to stimulate eight to ten universities to apply to the National Science Foundation for summer institutes in 1968. Many of our materials will be ready by that time.

R. PROJECT EVALUATION:

a. Instruments used: Multiple choice tests and open end questions.

b. Control groups: Yes

c. Feedback process: The Psychological Corporation is under contract to carry out evaluation of our first eight units. They will analyze the results by the following variables: aptitude, socio-economic status, type of school, regional location of school. Staff members will observe as many classes as possible during the teaching of the units. The teachers will be given answer sheets so that they may know how their own students did on the multiple choice test.

d. Behavioral objectives identified: None

e. Research evidence of objectives achieved: None

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The project has moved from Hanover, N. H. to Ann Arbor, Mich. Its staff has been greatly enlarged. Activities 2 and 3 under "H" have been added to activity 1.

T. PLANS FOR THE FUTURE: The evaluation of the short units has begun. The paperback series and the course will have been prepared by the summer of 1968, though not published. The short units will reach the publication stage early in 1968 and will appear in groups of eight or ten until early 1970.

A. PROJECT TITLE: SOUTHERN ILLINOIS UNIVERSITY - COMPREHENSIVE SCHOOL MATHEMATICS PROJECT (SIU-CSMP)

B. PROJECT DIRECTORS: Burt Kaufman, SIU-CSMP, University School, Southern Illinois University, Carbondale, Ill. 62901. Tel: 618-453-2427, X 42; Francis J. Kelly, Educational Research Bureau, Southern Illinois University, Carbondale, Ill. 62901. Tel: 618-453-2535.

C. PROJECT HEADQUARTERS:

a. Address: SIU-CSMP, University School, Southern Illinois University, Carbondale, Ill. 62901. Tel: 618-453-2427, X 42. Contact Burt Kaufman.

b. Facilities available for viewing: Classroom visitation; interviews with staff and students.

D. PRINCIPAL PROFESSIONAL STAFF: Burt Kaufman, Asst. Prof. of Mathematics, Co-Director for Curriculum; Francis J. Kelly, Assoc. Prof. of Educational Psychology, Co-Director for Research; Roger E. Robinson, Principal, University School, and Co-Director for Administration; Joseph Karmos, Instructor of Mathematics, Asst. Director for Curriculum; Dave Masters, Instructor of Mathematics, Asst. Director for Curriculum.

E. PROJECT SUPPORT: Central Midwestern Regional Educational Laboratory (CEMREL).

F. PROJECT HISTORY:

a. Principal originator: Burt Kaufman and Garrett Foster.

b. Date and place of initiation: September, 1965. Nova High School, Fort Lauderdale, Florida. This project was originally called "The Nova Comprehensive Mathematics Project."

c. Reason for initiation: To create an individualized mathematics curriculum (K-12) in the spirit of the Cambridge Conference recommendations.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The purpose of this project is to develop a totally individualized mathematics curriculum based on the spirit of the Cambridge Conference report, "Goals for School Mathematics" which will utilize modern technology to its fullest potential. It is also expected that this project will create, design and build a model school of the future in which such a curriculum would operate. To this end a systems approach will be taken. The chief difference between this and other projects is that we will stress the substantive aspects of education, the subject matter. For this reason professional mathematics will play a major and indispensable role.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Initially - mathematics K-12, but the curriculum will be ungraded; Long range - all school subjects (K-12), everything to be individualized.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. "A First Step Towards the Implementation of the Cambridge

Mathematics Curriculum in a K-12 Ungraded School" - Final Report of USOE Cooperative Research Project S-405.

2. Proposal for Phase I of a project to create an individualized mathematics curriculum in the spirit of the Cambridge Conference recommendations.

3. "Foundations of Modern Algebra" by Karmos, Kaufman and Exner. A textbook of 7 chapters studied in our track 1 curriculum (aroun 8th grade). This text will be published next year by the Wadsworth Publishing Co., but is presently available in mimeograph form.

4. "Number Systems of Algebra" by Kaufman, Karmos and Exner. A textbook of 9 chapters following "Foundations of Modern Algebra" in our track 1 curriculum. This is also available in mimeograph form until published.

5. "Introduction to Mathematical Analysis" by Kaufman, Karmos, Stephens, and Exner. A textbook of 5 chapters to follow "Number Systems of Algebra" in our track 1 sequence. This will be available in mimeograph form later this spring and will be published sometime in the future.

6. A copy of a speech entitled "The Empty Set of Excuses" given this past fall in New York City.

K. MATERIALS AVAILABLE FREE: No. 6, contact Burt Kaufman, SIU-CSMP, University School, Southern Illinois University, Carbondale, Illinois 62901.

L. MATERIALS PURCHASABLE:
1. $2.50
2. $4.00
3. $5.00
4. $5.00
5. $5.00

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: 10.
b. Some specific schools where course is being taught: University School - SIU; Nova High School, Ft. Lauderdale; Choir School of St. Thomas Church, New York. There is a good probability they will be taught at Weston High School, Weston, Conn., Falls Church High School, Falls Church, Virginia.

P. MATERIALS PRESENTLY BEING DEVELOPED: 3, 4, and 5 from above are being revised for publication. It is expected that we will do a vector geometry and trigonometry course and a calculus course in the future. The project will be spending the next ten years or so in developing activity packages described in Nos. 1 and 2 of the publications outlined in J.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: During the 3rd year of the project, it is expected that we will conduct a continued academic year institute to train master teachers for the curriculum and system being developed by the project. Even though no specific plans have been made as yet, we expect that the teachers involved will spend half time in formal course work and half time in material development.

R. **PROJECT EVALUATION:** The project has just begun. Control groups and a variety of instruments will be used in the evaluation. Details may be obtained in item No. 2, question J.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** Not previously reported.

T. **PLANS FOR THE FUTURE:** For details consult item No. 2 listed in question J.

A. PROJECT TITLE: SPECIAL MATERIALS SCIENCE PROJECT (SMSP)

B. PROJECT DIRECTOR: John J. Rizza, 42 Stevenson Ave., Peekskill, N. Y. 10566 Tel: 914-Pe 7-2241

C. PROJECT HEADQUARTERS:
a. Address: Mahopac High School, Mahopac, N. Y. 10541
Tel: 914-Ma 8-3415. Contact John J. Rizza, SMSP Director.
b. Facilities available for viewing: Student Laboratory Kits; Project Manuals; Project Stations - Weather, Natural History.

D. PRINCIPAL PROFESSIONAL STAFF: John J. Rizza, Director; Donald C. Pratt, Science Curriculum Coordinator; Margaret Stevens, Elementary Science Specialist; Vincent Gizzi, Physical Science Specialist; Eugene Arcery, School Psychologist; James Gilchrist, 6th grade teacher; Anthony Suriano, 7th grade teacher.

E. PROJECT SUPPORT:
a. Organizational sponsorship: Mahopac Board of Education.
b. Funding agency: E.S.E.A. Title I, U. S. Office of Education.

F. PROJECT HISTORY:
a. Principal originators: John J. Rizza and Donald C. Pratt.
b. Date and place of initiation: May, 1966, Mahopac High School.
c. Reason for initiation: To develop a science program for educationally deprived children in which they may achieve through learning by doing.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop a program of science activities for educationally deprived children in grades 6 and 7; to design activities to stimulate and interest educationally deprived children; to develop kits to accompany science activities, and to make science more meaningful to deprived children.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Grades 6 and 7 - General Science.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
PROJECT ALPHA I (Grade 6):
1. Observing and Recording - activities involved with making careful observations and recording of information.
2. Measurement - making measurements on physical and biological objects using student and teacher devised units.
3. Natural History - activities directed toward the individual study of different animals by children using various research techniques.
4. A Study in Ecology - using balanced aquaria children will study interrelationships by observing their own aquaria.
5. Variation and Nature - the forces involved in population genetic studies.
6. The Spectrum - activities involved in spectrum analysis of light.

PROJECT ALPHA II (Grade 7):

7. Observation and Measurement: Observing the Weather - activities designed to allow students to make visual non-technical observation and recording of weather phenomena; Day and Night - the study of day and night using student made models; The Seasons - what causes the changes in the seasons.

8. Metric Measurement - Introduce students to units in the metric system using only one symbol, i.e., gram, centimeter, milliliter.

9. Electricity - Introduce students by involvement in simple activities concerned with circuitry, circuit boards and conductors and non-conductors.

10. Tiny things - Activities demonstrating the development of lens, simple microscopy, the compound microscope and the study of microscopic objects and organisms.

K. MATERIALS AVAILABLE FREE: Progress Report and sample activities.

L. MATERIALS PURCHASABLE: None at present. Anticipate final printing during the summer of 1967, then materials will be available at printing costs.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Two

b. Some specific schools where course is being taught: Mahopac Middle School.

P. MATERIALS PRESENTLY BEING DEVELOPED:

1. Additional activities for present Project Alpha I & II.
12. Tentatively Project Alpha III (Grade 8) - 1967-68.
13. Tentatively Project Alpha IV (Grade 9) - 1968-69.

Subject to financial support approval.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: In-service training during school year tentatively for Summer of 1967 subject to available funds.

R. PROJECT EVALUATION:

a. Instruments used: School and College Ability Test; Sequential Test of Educational Progress; Teacher evaluation - subjective evaluation checklist.

b. Control groups: None.

c. Feedback process: Director observes all classes. Discussion follows with subject teachers.

d. Behavioral objectives identified: Ability to think; ability to work with peers; ability to succeed in program.

e. Research evidence of objectives achieved: Actual observations of children and the improvement in their attitude and behavior since the beginning of the program.

f. Other pertinent information: Each activity is highly motivating to students. This keeps interest and learning levels high, behavioral problems low.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not previously reported.

T. PLANS FOR THE FUTURE:

Summer 1967 - writing conference to revise Project Alpha I & II and planning conference Project Alpha III.
1967-68 School Year - writing conference Project Alpha III.
Summer 1968 - writing conference to revise Alpha III, and planning conference Alpha IV.
1968-69 School Year - writing conference to revise Alpha IV.
Summer 1969 - writing conference to revise Alpha IV - phase out.

A. PROJECT TITLE: STANFORD-BRENTWOOD COMPUTER-ASSISTED INSTRUCTION

B. PROJECT DIRECTORS: Patrick Suppes and Richard C. Atkinson, Institute for Mathematical Studies in the Social Sciences, Ventura Hall, Stanford University, Stanford, California 94305. Tel: 415-DA 1-2300 X2970.

C. PROJECT HEADQUARTERS:
a. Address: Brentwood School, Clark Avenue, East Palo Alto, California. Tel: 415-325-1560. Contact Patrick Suppes (Mathematics) or Richard C. Atkinson (Reading).
b. Facilities available for viewing: Visitors should make arrangements through Dr. Karl Anselm, IMSSS, Ventura Hall, Stanford University.

D. PRINCIPAL PROFESSIONAL STAFF: Patrick Suppes, Richard C. Atkinson, Project Directors; Jamesine Friend, Director of Mathematics Curriculum Group.

E. PROJECT SUPPORT:
a. Organizational sponsorship: Stanford University.
b. Funding agencies: United States Office of Education and National Science Foundation.

F. PROJECT HISTORY:
a. Principal originators: Patrick Suppes, Richard C. Atkinson.
b. Date and place of initiation: Summer, 1964, Brentwood School, East Palo Alto, Calif.
c. Reason for initiation: Investigation of computer-assisted instruction in elementary grades over an extended period of time.

G. PRESENT COMMERCIAL AFFILIATIONS: No direct commercial affiliations. Equipment being used has been purchased or leased from IBM, Philco, Westinghouse, and Digital Equipment Corporation.

H. PURPOSES AND SPECIFIC OBJECTIVES: To develop a full tutorial program in primary-school mathematics and reading.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: First-grade mathematics and reading.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Programmed instruction for grades 1 and 4 in mathematics.
2. "CAI Instruction at Brentwood School", a pamphlet prepared by William Rybensky and Thelno Knowles, Brentwood School, Clark Ave., East Palo Alto, Calif.
3. Technical Reports of the Institute.

K. MATERIALS AVAILABLE FREE: Nos. 2 and 3.

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None described.

O. USE OF PROJECT MATERIALS: Brentwood School, Clark Avenue, East Palo Alto, California.

P. **MATERIALS PRESENTLY BEING DEVELOPED:** Further work on mathematics curriculum for grades 1, 2, 4.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Regular in-service teacher training and close liaison with classroom teachers.

R. **PROJECT EVALUATION:**

a. Instruments used: Standard Achievement Tests.

b. Control groups: Yes. Control groups are matched classes in neighboring schools.

c. Feedback process: None described.

d. Behavioral objectives identified: Most important part of first analysis is analysis of mean rate of responding in terms of rate of learning and mean rate of errors. The second step is to identify structural variables in the curriculum materials that are the source of the main learning difficulties. Multi-linear regression analysis is being used for this purpose.

e. Research evidence of objectives achieved: Several technical reports from the Institute, particularly Technical Report 100, Linear structural models for response and latency performance in arithmetic.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** There was continued work on mathematical logic in Stanford Computer-based Laboratory for Learning and Teaching, in addition Grant School in the Cupertino Union School District and Walter Hays School in the Palo Alto Unified School District have drill-and-practice programs in arithmetic for third through sixth grades. A first and second grade arithmetic drill-and-practice program is being carried on at Oak Knoll School in the Menlo Park City School District. At Clifford School in the Redwood City School District there is also an arithmetic program and at Ravenswood High School in the Sequoia Union High School district there is a language arts study in spelling fundamentals for fifth and sixth graders.

T. **PLANS FOR THE FUTURE:** Continuation on the same general program for the academic year 1967-68. It is planned to include a university-level course in elementary Russian.

A. PROJECT TITLE: STUDY OF A QUANTITATIVE APPROACH IN ELEMENTARY SCHOOL SCIENCE*

B. PRINCIPAL ORIGINATORS AND DATE OF PROJECT INITIATION: Clifford E. Swartz and Ben Werner, Jr.; June 1964.

C. PROJECT DIRECTOR: Clifford E. Swartz

D. PROJECT HEADQUARTERS ADDRESS: Physics Department, State University of New York, Stony Brook, N.Y.

E. PROFESSIONAL STAFF: Clifford E. Swartz, Associate Professor of Physics

F. PROJECT SUPPORT:
a. Organizational sponsorship: Research Corporation, State University of New York.
b. Funding agency: National Science Foundation, until October, 1965.

G. SPECIFIC PURPOSES AND OBJECTIVES: We wrote about 70 science lessons on natural science topics, which were based on measurement and quantitative analysis. These were tried in local schools.

H. SPECIFIC SUBJECTS AND GRADE LEVEL: Grades 1-6

I. MATERIALS ALREADY PRODUCED AND DESCRIPTION: A report and complete copies have been filed with National Science Foundation.

J. USE OF PROJECT MATERIALS: Thirty teachers are using the complete program and 20 others are using some of the materials. Schools where the materials are used: Brentwood and South Huntington, New York.

K. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

L. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None listed

M. ADDITIONAL MATERIALS PRESENTLY BEING DEVELOPED: About 200 lessons so far, with 50 additional contemplated. These will be published commercially.

N. MATERIALS AVAILABLE FREE: A statement of the guidelines and a sampler containing lessons at four grade levels.

O. MATERIALS PURCHASABLE: None at present.

P. SPECIFIC PLANS FOR EVALUATION OF MATERIALS: During the trial year, teachers filled out report forms for each lesson. The complete account and analysis was filed with National Science Foundation.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Deliberately none--one of the purposes of the project was to develop material which could be used by teachers without any special training.

R. PROJECT ACTIVITIES SINCE MARCH 1965 REPORT: Not previously reported.

S. PLANS FOR THE FUTURE: Publication of the new series of about 250 lessons, K-6, will complete the project.

*Response made for the 1966 Report.

A. PROJECT TITLE: SURVEY OF RECENT EAST EUROPEAN LITERATURE IN SCHOOL AND COLLEGE MATHEMATICS

B. PROJECT DIRECTORS: Prof. Alfred L. Putnam, Department of Mathematics, Eckhart Hall 411, The University of Chicago, Chicago, Ill. 60637 Tel: 312-MI 3-0800, X2750; Prof. Izaak Wirszup, Department of Mathematics, Eckhart Hall 413, The University of Chicago, Chicago, Ill. 60637 Tel: 312-MI 3-0800, X2741

C. PROJECT HEADQUARTERS:

a. Address: Survey of Recent East European Literature in School and College Mathematics, Department of Mathematics, Eckhart Hall 410, The University of Chicago, Chicago, Ill. 60637
Tel: 312-MI 3-0800, X2750. Contact Project Directors.

b. Facilities available for viewing: A library consisting of over 5000 books and periodicals, principally Russian, on mathematics and its applications, on mathematics education, and on science.

D. PRINCIPAL PROFESSIONAL STAFF: Randell W. Magee, Editorial Assistant.

E. PROJECT SUPPORT:

a. Organizational sponsorship: University of Chicago, Department of Mathematics.

b. Funding agency: National Science Foundation.

F. PROJECT HISTORY:

a. Principal originators: A. F. Bausch; W. H. L. Meyer; A. L. Putnam; I. Wirszup.

b. Date and place of initiation: 1956, University of Chicago.

c. Reason for initiation: To answer urgent need to make available information and materials in mathematics and mathematics education from East European sources.

G. PRESENT COMMERCIAL AFFILIATIONS: D. C. Heath and Co., Holden-Day; Pergamon Press; Academic Press; The M.I.T. Press.

H. PURPOSES AND SPECIFIC OBJECTIVES: Principal aims of the Survey: to develop an extensive information program on current Soviet and other East European mathematics at the school and college level; to make available from these sources mathematical materials for teachers and students in American schools and colleges.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: From kindergarten through college level; mathematics and mathematics education.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: Survey publications by D. C. Heath and Company, 285 Columbus Ave., Boston 16, Mass. Titles in the series Topics in Mathematics are:

1. Algorithms and Automatic Computing Machines, by B. A. Trakhtenbrot
2. Areas and Logarithms, by A. I. Markushevich
3. Computation of Areas of Oriented Figures, by A. M. Lopshits
4. Configuration Theorems, by B. I. Argunov and L. A. Skornyakov
5. Equivalent and Equidecomposable Figures, by V. G. Boltyanskii

6. The Fibonacci Numbers, by N. N. Vorobyov
7. How to Construct Graphs, by G. E. Shilov, with Simplest Maxima and Minima Problems, by I. P. Natanson
8. Hyperbolic Functions, by V. G. Shervatov
9. Induction in Geometry, by L. I. Golovina and I. M. Yaglom
10. Introduction to the Theory of Games, by E. S. Venttsel
11. The Method of Mathematical Induction, by I. S. Sominskii
12. Mistakes in Geometric Proofs, by Ya. S. Dubnov
13. Proof in Geometry, by A. I. Fetisov
14. Summation of Infinitely Small Quantities, by I. P. Natanson
15. What is Linear Programming? by A. S. Barsov
16. Convex Figures and Polyhedra, by L. A. Lyusternik
17. Eight Lectures on Mathematical Analysis, by A. Ya. Khinchin
18. Multicolor Problems, by E. B. Dynkin and V. A. Uspenskii
19. Problems in the Theory of Numbers, by E. B. Dynkin and V. A. Uspenskii
20. Random Walks, by E. B. Dynkin and V. A. Uspenskii

In press:

21. Geometric Constructions in the Plane, by B. I. Argunov and M. B. Balk
22. Geometry of the Straightedge and Geometry of the Compass, by S. I. Zetel
23. Infinite Series, by A. I. Markushevich
24. Isoperimetry: Maximal and Minimal Properties of Geometric Figures, by D. A. Kryzhanovskii

Survey publications by the School Mathematics Study Group (as volume IV of Studies in Mathematics); available from A. C. Vroman, Inc., 367 South Pasadena Ave., Pasadena, Calif.:

25. Geometry, by B. V. Kutuzov

Survey publications by Holden-Day, Inc., 728 Montgomery St., San Francisco 11, Calif.:

26. Challenging Mathematical Problems with Elementary Solutions, volume I: Combinatorial Analysis, by A. M. Yaglom and I. M. Yaglom

In press:

27. Challenging Mathematical Problems with Elementary Solutions, volume II: Various Branches of Mathematics, by A. M. Yaglom and I. M. Yaglom

Survey publications by Pergamon Press, Inc.; available from The Macmillan Company, 60 Fifth Ave., New York, N. Y. 10011:

28. Envelopes, by V. G. Boltyanskii
29. Shortest Paths, by L. A. Lyusternik
30. Successive Approximation, by N. Ya. Vilenkin
31. Systems of Linear Equations, by B. E. Margulis

Survey publications by Academic Press, 111 Fifth Ave., New York, N. Y. 10003:

32. Geometric Transformations (Volume 1: Euclidean and Affine Transformations) by P. S. Modenov and A. S. Parkhomenko
33. Geometric Transformations (Volume 2: Projective Transformations) by P. S. Modenov and A. S. Parkhomenko

K. MATERIALS AVAILABLE FREE: Survey Bulletin - Survey of Recent East European Literature in School and College Mathematics, Department of Mathematics, Eckhart Hall 410, The University of Chicago, Chicago, Ill. 60637

L. MATERIALS PURCHASABLE: Addresses of publishers given in J above.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: Russian

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: English

O. USE OF PROJECT MATERIALS: Not described

P. MATERIALS PRESENTLY BEING DEVELOPED: Survey translations and adaptations from the Russian series *Bibliotechka fiziko-matematicheskoi shkoly*, under the editorship of Prof. I. M. Gelfand, are being published by The M.I.T. Press under the series title *Library of School Mathematics*. The four volumes listed below are already in press.

34. I. M. Gelfand, E. G. Glagoleva, A. A. Kirillov, *Metod koordinat* [The Method of Coordinates]

35. I. M. Gelfand, E. G. Glagoleva, E. E. Shnol, *Funktsii i grafiki* [Functions and Graphs]

36. S. I. Gelfand, M. L. Gerver, A. A. Kirillov, N. N. Konstantinov, A. G. Kushnirenko, *Zadachi po elementarnoi matematike; posledovatel'nosti, kombinatorika, predely*; [Problems in Elementary Mathematics; Sequences, Combinations, and Limits]

37. E. B. Dynkin, S. A. Molchanov, A. L. Rozental, A. K. Tolpygo, *Matematicheskie zadachi* [Mathematical Problems]

A joint effort by the School Mathematics Study Group of Stanford University and the Survey of the University of Chicago will soon result in the publication of a series of several volumes under the title *Studies in the Psychology of Learning and Teaching Mathematics*. As part of this SMSG-Survey series the translations and adaptations of the following Russian books have been completed.

38. L. G. Itelson, *Matematicheskie i kiberneticheskie metody v pedagogike* [Mathematical and Cybernetic Methods in Pedagogy]

39. L. N. Landa, *Algoritmizatsiya v obuchenii* [Algorithms and Teaching]

40. G. G. Maslova, *O programmirovannom obuchenii matematike* [Programmed Instruction in Mathematics]

41. N. A. Menchinskaya, M. I. Moro, *Voprosy metodiki i psikhologii obucheniya arifmetike v nachal'nykh klassakh* [Questions on Methodology and Psychology of Teaching Arithmetic in Elementary Grades]

42. M. I. Moro, *Samostoyatel'naya rabota uchashchikhsya na urokakh arifmetiki v nachal'nykh klassakh* [Independent Work for Pupils in Arithmetic Lessons in the Elementary Grades]

43. A. S. Pchelko, *Osnovy metodiki nachal'nogo obucheniya matematike* [Foundations of Methodology Used in Elementary Mathematics Instruction]

44. T. V. Rozanova, *Psikhologiya resheniya zadach glukhimi shkol'nikami* [The Psychology of Solving Problems by Deaf Pupils]

Translations and adaptations of the following books have been completed by the Survey and will soon be published:

45. A. I. Fetisov, Geometriya [Geometry]
46. S. V. Fomin, Sistemy schisleniya [Systems of Counting]
47. B. Yu. Kogan, Prilozhenie mekhaniki k geometrii [Application of Mechanics in Geometry]
48. A. I. Ostrovskii and B. A. Kordemskii, Geometriya pomogaet arifmetike [Geometry Helps Arithmetic]
49. G. E. Shilov, Prostaya gamma - ustroistvo muzykal'noi shkaly [The Musical Scale]
50. A. G. Shkolnik, Zadacha deleniya kruga [The Problem of Dividing the Circle]
51. Yu. A. Shreider, Chto takoe rasstoyanie? [What is Distance?]
52. N. N. Vorobiev, Priznaki delimosti [Tests for Divisibility]

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Not applicable.

R. PROJECT EVALUATION: Not applicable.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Not described.

T. PLANS FOR THE FUTURE: See P.

A. PROJECT TITLE: TEACHER'S AUTOMATED GUIDE (TAG)

B. PROJECT DIRECTOR: Dr. George S. Ingebo, Director Educational Research and Testing, Portland Public Schools, 631 N. E. Clackamas Street, Portland, Ore. 97208

C. PROJECT HEADQUARTERS:
a. Address: 631 Clackamas Street, Portland, Ore. 97208, Tel. 503-234-3392, X223, 335, Contact: Dr. George S. Ingebo
b. Facilities available for viewing: One remote station consisting of character generating cathode ray tube display, a screen, typewritten keyboard, a telaprinter is in operation at Rice Elementary School. Another remote station is planned for Wilcox Elementary School in September, 1967. The Cybex Keysort deck "hand computer" will also be available for visitor viewing.

D. PRINCIPAL PROFESSIONAL STAFF: Thomas Crowder, Project Coordinator; Robert Coffin, Director of Experimental Programming; Genevieve Mattoon, Curriculum Consultant; Gordon Neideigh, Principal of Rice and Wilcox Elementary Schools; Barbara Raz, Programmer; Joyce Oldenberg, Programmer Assistant; John Neeley, Cybernetics Committee chairman.

E. PROJECT SUPPORT:
a. Organizational sponsorships: Portland Public Schools
b. Funding agency: Lewis W. and Maul Hill Family Foundation

F. PROJECT HISTORY:
a. Principal originator: Donald W. Stotler, Supervisor of Science
b. Date and place of initiation: June 1964, Portland Public Schools
c. Reason for initiation: To develop a branching, self-renewing, process-oriented science curriculum

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To experimentally develop an automated, self-renewing teachers guide whereby individual pupil data and curriculum alternatives are made accessible to teachers through a computer system. Essential features of the program include ready access to background data on students and their readiness to learn; a wide variety of curriculum activities in AAAS format; and a provision for feedback of both pupil and curriculum information to make the system self-correcting and increasingly useful as a professional tool for the teacher.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Science K-3 for two years of the Pilot Program (1966-68). K-12 for three year developmental period (1968-71). K-14 for controlled experiment.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. A deck of cards on which are recorded teaching activities classified for computer retrieval according to the objectives of the AAAS elementary science program. These are on Keysort cards organized in much the same way as the science teachers adaptable curriculum (STAC) cards (see 1964 and 1965 versions of AAAS Clearinghouse Report).

2. Behavioral check-list for teachers: To record pupil's successes with various science tasks.

K. MATERIALS AVAILABLE FREE: Sample Cybex reproduced by the computer

L. MATERIALS PURCHASABLE: None

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Undetermined

O. USE OF PROJECT MATERIALS:
- **a. Number of teachers using materials: 18**
- **b. Some specific schools where course is being taught: Rice Elementary and Wilcox Elementary Schools**

P. MATERIALS PRESENTLY BEING DEVELOPED:
- **3. Program software**
- **4. Information input forms for both feedback and program improvement**

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Internship training of some teachers in the use of remote stations; Forty in-service classes; Professional meetings; Within school organized study plans.

R. PROJECT EVALUATION:
- **a. Instruments used: Portland City-Wide Testing Program**
- **b. Control groups: The City of Portland**
- **c. Feedback process: Two kinds of information are fed back into the computer after each classroom science activity. First, the pupil behavioral observations made by the teacher, and second, change in instructional approach worked out by a consultant after use of the activity, based on observations supplied by the teacher. These are fed back into the computer to change or increase the alternatives available to the teacher the next time the activity is called for.**

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The Cybex deck "hand computer" is being used for a second year at Rice and for the first year at Wilcox Elementary School. The Regional Advisory Committee, chaired by Superintendent Melvin Barnes, and represented by local colleges and science related industries and agencies, helped in planning a proposal for funding the project over a five-year period. The Louis W. and Maud Hill Family Foundation granted additional support in the amount of $14,000 to help establish a prototype of the science supply center needed in the project, and to make possible additional studies that concern development of improved methods of recording and communicating student information. A committee drew up plans for a regional science demonstration and supply center. All teachers and principals in a proposed developmental area consisting of eight elementary schools within a high school attendance area have been given in-service training in the AAAS process approach. They will have had two years of work with AAAS materials by the time the computer remote stations are put in their schools.

T. PLANS FOR THE FUTURE: The Pilot program should be completed by September, 1968 and a two or three year (as needed) developmental period then should be entered to ready the system for an extension of the experiment that will probably include the Portland Community College. As the developmental phase expands to other schools from Rice and Wilcox, these two schools will probably be ready to move from science into other areas of the curriculum on a pilot basis.

A. PROJECT TITLE: TEACHING MATHEMATICS THROUGH THE USE OF A TIME-SHARED COMPUTER (CAM)

B. PROJECT DIRECTOR: Jesse O. Richardson, Senior Supervisor in Education, Massachusetts Dept. of Education, 200 Newbury St., Boston, Mass. 02116. Tel: 617-262-9650.

C. PROJECT HEADQUARTERS:

a. Address: Computer Mathematics Project H-212, Massachusetts Dept. of Education, 200 Newbury Street, Boston, Mass. 02116. Tel: 617-262-9650. Contact Project Director.

b. Facilities available for viewing: Mathematics instruction in elementary and secondary schools using remote teletypewriter terminals as teaching aids and resource devices; Time-shared multi-access, computer facilities providing highly interactive conversational language capabilities (TELCOMP).

D. PRINCIPAL PROFESSIONAL STAFF: Wallace Feurzeig, Coordinator; Field Supervisors: Walter Koetke, James Pender; Field Consultants: Lucille Darley, Seymour Papert; Paul Castleman, Computer System Supervisor; Consultants: G. Octo Barnett, M.D.; Stanley J. Bezuszka, S.J.; Richard H. Bolt; William Bossert; Robert Fano; W. Eugene Fergusson; Hiram Haggett; Evan Herbert; Anthony Oettinger; David Page; Richard Pieters; Programmers: Richard Grant; Cynthia Solomon.

E. PROJECT SUPPORT:

a. Organizational sponsorship: Board of Education, Commonwealth of Massachusetts.

b. Funding agency: U. S. Office of Education.

F. PROJECT HISTORY:

a. Principal originators: Owen B. Kiernan; Jesse O. Richardson.

b. Date and place of initiation: June 1, 1965, Boston, Mass.

c. Reason for initiation: To investigate the use of a time-shared computer as a teaching aid for mathematics.

G. PRESENT COMMERCIAL AFFILIATIONS: Technical support and collaboration, and time-shared computer services are furnished by Bolt Beranek and Newman Inc., of Cambridge, Mass.

H. PURPOSES AND SPECIFIC OBJECTIVES: A major problem in the field of mathematics education is the development of new teaching tools. This proposed study has as its basic goal the development of a mathematical laboratory based on a time-shared digital computer. In working towards this goal we will focus on solving the following problems: (1) how can a time-shared computer be programmed to act as a useful tool for teaching mathematics; (2) how can classroom teachers be taught the necessary techniques to enable them to use this new teaching tool successfully; and (3) how can such multiple-user computer facilities be developed in line with economic constraints.

In addition to demonstrating the economic feasibility of this new approach, we plan to test our hypotheses that: a terminal teletypewriter connected to a large computer operated in the time-shared mode will give the mathematics student the feeling of working on his own computer; having the computer on an "always ready" basis will encourage students to engage extensively in voluntary extracurricular use of the computer terminals; the presence of a continuously available real-time computer in the classroom will lead students to acquire a more thorough grasp of mathematics.

I. **SPECIFIC SUBJECTS, GRADE AND AGE LEVELS:** Mathematics curriculum at grades six through twelve; ages eleven through eighteen.

J. **DESCRIPTION OF MATERIALS ALREADY PRODUCED:**

1. CAM (Computer-Assisted Mathematics) Newsletter, issued periodically.

K. **MATERIALS AVAILABLE FREE:** No. 1 - request from Project Director.

L. **MATERIALS PURCHASABLE:** None available.

M. **LANGUAGE IN WHICH MATERIALS WERE WRITTEN:** English

N. **LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION:** None

O. **USE OF PROJECT MATERIALS:**

a. Number of teachers using materials: 40

b. Some specific schools where course is being taught: Mass.: Phillips Academy, Andover; Kendall School, Winn Brook School, Belmont; Brookline High School, Brookline; Lexington High School, Lexington; Westwood High School, Westwood; Vinson-Owen School, Winchester. Conn.: Bloomfield High School, Bloomfield; Manchester High School, Manchester; Platt High School, Meriden. Vt.: Burlington High School, Burlington; Champlain Valley Union High School, Hinesburg.

P. **MATERIALS PRESENTLY BEING DEVELOPED:**

2. Concept-oriented curriculum materials for use in computer-based mathematics instruction are under development. They will be available for September, 1967.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Groups of educators, teachers from the participating schools involved in the teaching of mathematics at both elementary and secondary school levels, scientists involved in the time-shared use of computers, and members of the project advisory board were assembled for 6-week workshops during the summers of 1965 and 1966. These sessions proceeded to: teach the mathematics teachers the fundamentals of computer usage and the potentials of a real-time computer in the mathematics and science classroom; review and improve the concept-oriented curriculum materials developed for the classes using the computer; evaluate the results of the pilot and operational phases of the experiment conducted during the spring semester of 1965, and the academic year 1965-1966; establish a user-group for teachers and students to write and share programs over the course of the study; thoroughly test the computer programs developed during the course of the experiment; develop computer-based materials to be used during the school years 1965-1966 and 1966-1967.

R. PROJECT EVALUATION:

a. Instruments used: Sequential Test of Education Progress (STEP), mathematics form 4A,B for grade 6; form 3A,B for grade 9; form 2A,B for grade 11.

b. Control groups: Yes, for each participating school.

c. Feedback process: Liaison is maintained with the participating schools through the field consultants and project staff. A library file of student and teacher generated computer programs is maintained in the computer memory, available to all user schools. Daily information concerning project activities is distributed through the network of remote teletype terminals to all the participants.

d. Behavioral objectives identified: Increased student knowledge about mathematics; increased student knowledge about digital computers; changed student attitudes towards the role of the computer in our society; opinions, either positive or negative, among teachers, school administrators, and parents, about the value and advisability of a computer-oriented mathematics program.

e. Research evidence of objectives achieved: The preliminary results of the research program indicate that: participating teachers and students learned to use the time-shared computer and enjoyed using it; the computer terminals were heavily used by average as well as by gifted students; students used the computer for solving problems in chemistry, biology, physics, and English, as well as mathematics; the programming experience directly motivated many students to learn more mathematics--even away from the computer terminals; in the judgment of teachers, the computer provided many students with an environment for independent mathematical discovery.

f. Other pertinent information: High school teachers participating in the project summarized their experiences throughout the year as follows: "As the year progressed . . . ideas which were generated in a classroom discussion and elaborated by a student at the terminal in his spare time have produced some very original and sophisticated work in diverse fields. Programs were written on topics from geometry, calculus, probability, number theory, game theory, English, Latin, music, photography, cryptography, and psychology. Many of these students . . . in order to achieve desired results were forced to generalize and abstract in a manner which, under ordinary circumstances, they never would have done. Many theoretical concepts were made concrete, seemingly divergent ideas were connected, a logical approach to problem-solving and an analytical way of thinking developed, and a cooperative interaction between students was observed. . . ."

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The program of work done during the past year under Project H-212 has demonstrated positive results which are stated next, in brief.

A time-shared computer can be programmed as a useful tool for teaching mathematics through developing and providing simple algorithmic languages for expressing mathematical procedures. These languages must be easy to learn and easy to use by teachers as well as by students. The Telcomp language, used in Project H-212, is exemplary. Teachers can be successfully taught the necessary programming techniques enabling them to use algorithmic languages by means of special teacher training workshops presenting a well specified course of instruction in programming concepts and applications. Multiple-user computer facilities for classroom use can be developed economically in two ways: through systems dedicated to a particular type of educational service, and through general educational information handling systems offering many different services for instruction, educational administration, and educational research. Such developments assume continued engineering and "software" improvements in computer and data communications technology. During the period of the project such improvements have already resulted in significant reductions in computer time lease costs (from about $20/hour to about $10/hour); rates in the neighborhood of $1 per hour are now thought likely within a few years. The project research effort established that computers are valuable as laboratory tools for extracurricular instruction, and indicated that computers can be of extraordinary value when utilized as part of regular classroom instruction, augmenting the mathematics curriculum.

T. PLANS FOR THE FUTURE: Development of concept-oriented instructional materials will continue. A report of the project will be published, which will include: a description of the time-shared computer system used; a description of the computers that are simulated at the terminals; a description of the programming systems made available through the terminals; the curriculum units developed during the program; the tests developed for evaluation of achievement in computer study; the results of all tests given and an interpretation of their statistical significance.

A. PROJECT TITLE: UNIVERSITY OF ILLINOIS ARITHMETIC PROJECT (UIAP)

B. PROJECT DIRECTOR: David A. Page, 887 Commonwealth Ave., Newton, Mass. Tel: 332-9529.

C. PROJECT HEADQUARTERS:

a. Address: University of Illinois Arithmetic Project, 372 Main St., Watertown, Mass. 02172. Tel: 924-2122. Contact Mrs. Patricia T. Kosinar, Assistant Director.

b. Facilities available for viewing: Project movies and demonstration classes.

D. PRINCIPAL PROFESSIONAL STAFF: Teachers - L. Lee Osburn; Phyllis Klein; Carol Gray; Francis Corcoran; Maureen Stefanini; Artist - Edmund DeWan.

E. PROJECT SUPPORT:

a. Organizational sponsorship: University of Illinois, Education Development Center.

b. Funding agencies: National Science Foundation; Carnegie Corporation; Ford Foundation; Education Development Center.

F. PROJECT HISTORY:

a. Principal originator: David A. Page.

b. Date and place of initiation: 1958, University of Illinois, Urbana, Illinois.

c. Reason for initiation: None described.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The central theme of the Project is that the study of mathematics should be an adventure, requiring and deserving hard work. Children who grasp some of the inherent fascination of real mathematics while they are in elementary school are well on the way to success in further study of mathematics and science. Students who are not to continue a formal study of mathematics deserve a taste of the subject that is at least as appealing.

The Project is not attempting to develop a systematic curriculum for any grade level, in the view that determining an adequate curriculum is not possible until more alternatives exist to choose among. What is needed are frameworks that provide day-to-day, "here-is-something-to-try" ideas for the classroom. The emphasis is on things that the teacher can begin working with soon. Teachers beginning an institute are encouraged to start topics with their classes within a few weeks. Not only is the effectiveness of the institute increased, but many teachers see an immediate leap in their students' interest and involvement in mathematics.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics, Grades K-6.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED: Pamphlets and Articles

1. Ways to Find How Many
2. Maneuvers on Lattices
3. A First Grade Sample
4. Well-Adjusted Tapezoids
5. Number Lines for the Orbiting Atomic Teacher
6. Probability

Book: 7. Number Lines, Functions, and Fundamental Topics

K. MATERIALS AVAILABLE FREE: Nos. 1-6, available free in single copies.

L. MATERIALS PURCHASABLE: Nos. 1-6 may be obtained in quantity for 20 cents each by writing to the Project; No. 7 may be obtained at book stores or from the publisher, The Macmillan Company.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: African and others, still undetermined.

O. USE OF PROJECT MATERIALS: Unknown.

P. MATERIALS PRESENTLY BEING DEVELOPED: See Q.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: To introduce its materials to teachers, the Project is preparing the first of a series of in-service courses that can be given without expert mathematical guidance. To be completed in 1968, this course will consist of: (1) written lessons, including exposition and sequences of problems to be worked by the teachers taking the course. Much of this work is closely related to that which the teachers will do with their classes; (2) supplementary written materials that suggest further work when teachers have begun teaching a topic; (3) motion pictures of classes of children being taught by a variety of teachers; (4) detailed guides for correctors and discussion leaders.

Course materials reflect extensive trial and revision through prototype institutes. The Project, currently operating in association with Educational Services Incorporated in Watertown, Mass., has given in-service institutes for teachers in Concord, Newton, Wellesley, Framingham, Watertown, and in Niles, Illinois, as well as summer institutes at Urbana. Nearly all staff members of the Project regularly teach classes from kindergarten through seventh grade in Watertown and other Boston area schools.

R. PROJECT EVALUATION: None described.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: None described.

T. PLANS FOR THE FUTURE: None described.

A. PROJECT TITLE: UNIVERSITY OF ILLINOIS COMMITTEE ON SCHOOL MATHEMATICS (UICSM)

B. PROJECT DIRECTOR: Professor Max Beberman, 1210 W. Springfield, Urbana, Ill. 61820, Tel. 207-333-0150

C. PROJECT HEADQUARTERS:
a. Address: Same as "B" above. Contact: Max Beberman, Director
b. Facilities available for viewing: University High School, a secondary school devoted to curriculum development.

D. PRINCIPAL PROFESSIONAL STAFF: Max Beberman, Director; William Golden, Assistant to the Director; Peter Braunfeld, Mathematician; Herbert E. Vaughan, Mathematician; Staven Szabo, Writer

E. PROJECT SUPPORT:
a. Organizational sponsorship: University of Illinois
b. Funding agencies: Carnegie Corporation of New York (until June, 1962); U.S. Office of Education (until December, 1964); National Science Foundation (1962 -).

F. PROJECT HISTORY:
a. Principal originators: Colleges of Education, Engineering, and Liberal Arts and Sciences of the University of Illinois
b. Date and place of initiation: December 1951; University of Illinois
c. Reason for initiation: Dissatisfaction with the mathematics preparation of incoming freshman at the University of Illinois and the desire to guide high schools in improving their mathematics offerings.

G. PRESENT COMMERCIAL AFFILIATIONS: Some texts produced by the UICSM are published by D.C. Heath and Co. Films produced by the UICSM are distributed by Modern Learning Aids, Inc.

H. PURPOSES AND SPECIFIC OBJECTIVES: Until 1962 the UICSM devoted its efforts to producing a highly self-consistent and inter-related series of texts for college bound students in grades 9-12. Those texts are unusual in that they embody "discovery methos" pedagogy; they were the first to introduce a strong deductive thread to the teaching of elementary algebra; and they introduce and use principles of logic and a level of precision in language which is not common to high school texts. Since 1962, our major curriculum development effort has been the development of unusual approaches to topics in junior high school mathematics appropriate for culturally disadvantaged students in large urban school systems.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: The UICSM program for senior grades 9-12: Algebra, plane Euclidean geometry, advanced algebra, and circular functions, with tendencies on solid geometry, logic, and other topics; The UICSM Vector geometry course: a two-year sequence in three-dimensional Euclidean geometry, linear algebra, and trigonometry with a vectorial approach for able students in senior high school; The UICSM 7th grade materials: The arithmetic of common fractions, decimals and percents with using unconventional models and heavy reliance on pictures for culturally disadvantaged junior high school students with low achievement in mathematics; The UICSM 8th grade materials: plane geometries approached through motions in the plane for culturally deprived 8th grade students.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. UICSM HIGH SCHOOL MATHEMATICS; UNITS 1-11 (including teachers commentaries)
2. Examinations for Units 1-6
3. Teacher-training films-demonstrations of a class studying the UICSM 9th grade course
4. Self-instructional texts on solid geometry, logic, introduction to algebra

K. MATERIALS AVAILABLE FREE: None available from item listings above. Reprints of articles written by staff available upon request.

L. MATERIALS PURCHASABLE:
1. UICSM HIGH SCHOOL MATHEMATICS, UNITS 1-11 (individual units)
UICSM HIGH SCHOOL MATHEMATICS, COURSE 1 (revised Units 1-4)
UICSM HIGH SCHOOL MATHEMATICS, COURSE 2 (revised Units 6 and 9)
UICSM HIGH SCHOOL MATHEMATICS, COURSE 3 (revised Units 5,7,8 and 9) Available from D.C. Heath and Co., Text distributor
2. Available from D.C. Heath and Company
3. Available from Modern Learning Aids, Inc.
4. Available through UICSM Project, 1210 W. Springfield, Urbana

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: Spanish and French

O. USE OF PROJECT MATERIALS:
a. Number of teachers using materials: Unknown
b. Some specific schools where course is being taught: Pascack Valley High School, Hillsdale, N.J.; Boulder City High School, Boulder City, Nev.; Northridge Junior High School - John Muir J.H.S. both in Los Angeles; Sherwood J.H.S., Memphis, Tenn.; Dole Intermediate School, Honolulu; Central H.S., Philadelphia, Pa.

P. MATERIALS PRESENTLY BEING DEVELOPED: 5. 7th and 8th Grade materials for under-achievers in culturally deprived areas and vector geometry for able senior high school students.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Teachers are trained in summer institutes and by supervisors [either local or from UICSM] who visit them in their classes during the academic year.

R. PROJECT EVALUATION:
a. Instruments used: Instruments used are locally produced tests of achievement on the specific tasks for which we provide instruction by project members.
b. Control groups: None
c. Feedback process: Teachers report in writing and orally to project coordinators. These reports and compiled test results are relayed to authors on the revision teams.

d. Behavioral objectives identified: None described
e. Research evidence of objectives achieved: None described

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: The final revisions of the vector geometry course and 7th grade course have been begun. Publication arrangements for these materials are being formulated.

T. PLANS FOR THE FUTURE: Final versions of the 7th and 8th grade materials will be produced by project staff during 1967 and 1968. New projects, perhaps in computer-based education in mathematics, are contemplated beginning in September 1968.

A. PROJECT TITLE: UNIVERSITY OF MARYLAND MATHEMATICS PROJECT (UMMaP)

B. PROJECT DIRECTORS: Professor John R. Mayor, Director, University of Maryland Mathematics Project, College of Education, University of Maryland, College Park, Md. 20740; Professor James H. Henkelman, Assistant Director (same address).

C. PROJECT HEADQUARTERS:
a. Address: University of Maryland Mathematics Project, College of Education, University of Maryland, College Park, Md. 20740 Tel: 301-454-2031. Contact either the Director or Assistant Director at the above address.
b. Facilities available for viewing: Samples of textbooks prepared and reprints of research reports.

D. PRINCIPAL PROFESSIONAL STAFF: Director and Assistant Director listed above; Mildred B. Cole and Henry H. Walbesser, Jr., College of Education, University of Maryland.

E. PROJECT SUPPORT: U. S. Office of Education support for Maryland Elementary Mathematics Inservice Program.

F. PROJECT HISTORY:
a. Principal originators: John R. Mayor and Helen Garstens of the University of Maryland.
b. Date and place of initiation: 1957, University of Maryland.
c. Reason for initiation: To develop experimental courses in mathematics for use in junior high school.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The principal purpose of the project is to contribute to the improvement of the teaching of mathematics. The project has produced experimental textbooks for mathematics in junior high school and experimental textbooks for courses in mathematics for elementary teachers. In addition, the project has conducted research studies in the learning of mathematics. Presently the main efforts of the project are directed toward the development of an inservice course for elementary teachers of mathematics which incorporates behavioral objectives and specific evaluation.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Mathematics - Grades seven and eight; Preservice elementary teachers; Inservice elementary teachers.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Mathematics for the Junior High School: First Book. College Park, Maryland: University of Maryland, College of Education, 1959.
2. Answer Book for 1.
3. Mathematics for the Junior High School: Second Book. College Park, Maryland: University of Maryland, College of Education, 1961.
4. Teacher's Guide for 3.

5. Mathematics for Elementary School Teachers. College Park, Maryland, University of Maryland Mathematics Project, College of Education, 1964.

6. Mathematics for Elementary School Teachers: Book II. College Park, Maryland, University of Maryland Mathematics Project, College of Education, 1965.

7. Gagné, Robert M. and Otto C. Bassler. "Study of Retention of Some Topics of Elementary Non-Metric Geometry." Journal of Educational Psychology 54: 123-31; 1963.

8. Gagné, Robert M., John R. Mayor, Helen L. Garstens, and Noel E. Paradise. "Factors in Acquiring Knowledge of a Mathematical Task." Psychological Monographs, 1962, 76, No. 7 (Whole No. 526).

9. Gagné, Robert M. and Noel E. Paradise. "Abilities and Learning Sets in Knowledge Acquisition." Psychological Monographs, 1961, 75, No. 14 (Whole No. 518).

10. Gagné, Robert M. and staff, University of Maryland Mathematics Project. "Some Factors in Learning Non-Metric Geometry." Monograph of Society for Research in Child Development, 1965.

11. Mayor, John R., James H. Henkelman, and Henry H. Walbesser, Jr., "An Implication for Teacher Education of Recent Research in Mathematics Education." Journal of Teacher Education, 16: 483-90; 1965.

12. Maryland Elementary Mathematics Inservice Program. Sample Instructional Session.

K. MATERIALS AVAILABLE FREE: 9, 11, 12 - Available from project address.

L. MATERIALS PURCHASABLE: 1. $3.25; 2. $2.00; 3. $3.25; 4. $2.00; 5. $2.50; 6. $2.50. Available from project address.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No plans for translation.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: No record available.

b. Some specific schools where course is being taught: Mathematics courses for elementary teachers at the University of Maryland.

P. MATERIALS PRESENTLY BEING DEVELOPED: 13. Inservice course in mathematics for teachers in the elementary school.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None described.

R. PROJECT EVALUATION:

a. Instruments used: Evaluative instruments based on the behavioral objectives for the inservice courses in mathematics for teachers in elementary school.

b. Control groups: No control groups are involved in the evaluation.

c. Feedback process: Preliminary editions of inservice course materials are used in several area elementary schools with feedback provided by evaluative instruments for the objectives and observation forms.

d. Behavioral objectives identified: This is a basic premise of the Maryland Elementary Mathematics Inservice Program. Behaviora objectives were first identified; materials were then developed to achieve these objectives; evaluative instruments were then designed to measure the achievement of these objectives.

e. Research evidence of objectives achieved: The results of try out data for the achievement of behavioral objectives are available.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Initiation of Maryland Elementary Mathematics Inservice Program as a model for inservice training of elementary school teachers in mathematics. This program involves the specifying of behavioral objectives and the development of instructional materials to achieve the objectives.

T. PLANS FOR THE FUTURE: In 1967 work will continue on the development and evaluation of the inservice course for elementary teachers and also on research in the learning of mathematics.

SYNOPSES

The following brief descriptions concern projects which are in initial stages of development, or are examples of work being done by local and regional groups. They are included to give readers an appreciation of the variety of approaches being taken in curriculum development and a preview of new work as it begins.

I. An Annotated Bibliography of Elementary School Science Experimental Projects has been compiled by James R. Wailes at the University of Colorado. The publication is available from the Bureau of Educational Research, Hellems Annex 151, University of Colorado, Boulder, Colorado 80302 at a cost of thirty-five cents.

II. A project involving the use of calculators in teaching General Mathematics as a method of motivation and prevention of student drop-outs is being tried in several Arkansas schools. Materials titled Drop In Mathematics have been developed and may be acquired by sending five dollars to Wynne Public Schools, Wynne, Arkansas 72396, attention of Gene Catterton.

III. A Center for Research In College Instruction of Science and Mathematics (CRICISAM) has been established at Florida State University. Activities will include investigation, development, and dissemination of materials and techniques for collegiate instruction in science and mathematics. Correspondence should be directed to Dr. Guenter Schwarz, Director, CRICISAM, 212 Science Building, Florida State University, Tallahassee, Florida 32306.

IV. The Concepts and Applications of Mathematics Project (CAMP) has been initiated to form a national network of teachers to cooperate in developing and testing new techniques and materials for teaching mathematics to the low achiever in grades 7-9. The project director is Dr. Paul C. Rosenbloom. Correspondence should be directed to William H. Thompson, Administrative Assistant CAMP, Central College, Pella, Iowa 50219.

V. An ERIC Information Analysis Center for Science Education has been established near Ohio State University. When in full operation, this center will review and index selected reports of research in science education. Correspondence should be directed to Dr. John S. Richardson, Director, or Dr. Robert W. Howe, Associate Director, ERIC Information Analysis Center for Science Education, 1460 West Lane Avenue, Columbus, Ohio 43221.

VI. The General Mathematics Writing Project of the National Council of Teachers of Mathematics has completed a series ("Experiences in Mathematical Discovery") of ten self-contained units, each of which is designed for use by students of ninth-grade general mathematics. The titles in the series are as follows: Unit 1: Formulas, Graphs, and Patterns; Unit 2: Properties of Operations with Numbers; Unit 3: Mathematical Sentences; Unit 4: Geometry; Unit 5: Arrangements and Selections; Unit 6: Mathematical Thinking; Unit 7: Rational Numbers; Unit 8: Ratio, Proportions, and Percent; Unit 9: Measurement; Unit 10: Positive and Negative Numbers. The units may be purchased from the National Council of Teachers of Mathematics, 1201 Sixteenth Street, N. W., Washington, D.C. 20036

VII. The Massachusetts Department of Education, in cooperation with NASA, is developing a K-12 resource guide which will assist the classroom teacher in identifying and relating recent advances in aerospace science and technology to subject matter areas. The material is currently undergoing editorial review. Correspondence should be directed to Mr. John W. Packard, 200 Newbury Street, Boston, Massachusetts 02116.

VIII. Math-I and Math-II is an attempt to develop a two-year sequential program in mathematics at grades 9-10 for the non-college bound student in the 30th to 60th percentile. A descriptive bulletin is available from Mr. Fernand J. Prevost, State Department of Education, Concord, New Hampshire 03301.

IX. The mathematics, science, and engineering projects supported by the Science Course Improvement Programs of the National Science Foundation are described in a recent publication titled Course and Curriculum Improvement Projects, available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402 at a cost of 65 cents.

X. An elementary science project serving Hanover and Lyme, N. H. and Norwich, Vt. is introducing various units of the new curriculum projects in an attempt to build a coherent and flexible science curriculum reflecting the strengths of each of the major programs. For additional information contact Mrs. Barbara Ragle, Elementary Science Project, Norwich, Vermont.

XI. In a Longitudinal Study of the Effectiveness of Children's Experimentation and Learning of Selected Physics Principles, children in grades 1-6 are designing and conducting their own experiments and drawing conclusions from them. Fifteen teachers are participating in the study. No materials are available at the present time. Correspondence should be directed to Arnold M. Lahti, Professor of Physics, West Washington State College, Bellingham, Washington 98225.

The College Commissions of the United States

A. TITLE OF COMMISSION: ADVISORY COUNCIL ON COLLEGE CHEMISTRY -- ACCC OR AC_3

B. CHAIRMAN: L. Carroll King
Address: Department of Chemistry, Northwestern University
Evanston, Illinois 60201

C. DIRECTOR OR EXEC. SEC.: W. B. Cook (until April 1, 1967); then replacement to be selected)
Address: 701 Welch Road, Suite 1124, Palo Alto, Calif. 94304

D. SOURCES OF FINANCIAL SUPPORT: National Science Foundation.

E. OBJECTIVES OF COMMISSION: Improvement and innovation in undergraduate chemistry curricula. The Council collects and disseminates information on effective ways of improving teaching in colleges and universities. It hopes to provide the leadership and stimulus for a number of projects throughout the chemical education community which will result in imaginative, up-to-date curricula, more effective tools for learning, improved textual material, innovations in the experimental aspects of chemistry instruction, increased emphasis on training college chemistry teachers and stimulating interdisciplinary programs for non-science majors. In essence, the Council will serve as a nerve center for curricular activity in universities and colleges including two-year colleges.

F. PROJECTS NOW UNDERWAY:

Committee on Curriculum and Advanced Courses--D. N. Hume, Chairman
1. A conference to study the integration of biochemistry into the undergraduate chemistry curriculum.
2. Studies to develop a list of fundamental concepts which should be encompassed in undergraduate chemistry.

Freshman Chemistry Committee--R. J. Kokes, Chairman
1. Approximately six conferences on topics such as the incorporation of dynamics and quantum mechanics into introductory chemistry, structure as a theme in teaching freshman chemistry, the use of "lab by film," and a comparison of the effectiveness of current teaching procedures with proposed alternatives.

Junior College Committee--W. T. Mooney, Jr., Chairman
1. To hold a number of regional meetings aimed at the preparation of "suggestions for developing chemistry programs in the two-year colleges."
2. To provide a panel of consultants available to advise on the development of chemistry programs.
3. To devise special short courses, internship and orientation programs for faculty.
4. To promote faculty research in junior colleges.
5. To develop a "library list" for two-year colleges.

Science for Non-Science Majors Committee--R. C. Anderson, Chairman
1. To collect information, via a questionnaire, about science courses for non-science majors, and to develop a source book describing such courses at various colleges and universities. (The questionnaire has been distributed.)

2. To hold a conference on new conceptual approaches to such courses.

3. To cooperate with the Junior College Committee, the Division of Chemical Education, etc., on projects of mutual interest.

Teacher Development Committee--R. C. Brasted, Chairman

1. A conference to devise an "academic degree ladder" to describe the abilities and capabilities of teachers.

2. To implement a proposal which recommends a national program of predoctoral fellowships incorporating some teaching responsibilities.

3. To study alternate postdoctoral programs for the teaching-oriented graduate.

4. To devise various attacks on the technical obsolescence of teachers.

Teaching Aids Committee--W. T. Lippincott, Chairman

1. To promote the production and use of single concept film loops.

2. To promote the utilization of instant replay video tape recordings for instructional purposes.

3. To aid in the development of computer assisted instruction.

4. To prepare a state-of-the-art report on film loops, TV tape recorders, and computers for instruction.

Panel on Mathematical Preparation--W. H. Eberhardt--Chairman

1. To collect background information (via a questionnaire which has been mailed) on the recommended mathematical training for chemists.

2. For a panel to use the collected information in the preparation of a set of guidelines which will be distributed to all interested parties.

Panel on Liberal Arts Colleges--E. L. Haenisch, Chairman

1. To collect information (via a questionnaire to all liberal arts colleges and to selected universities, which has been mailed) concerning the role of liberal arts colleges in the training of chemists.

2. To hold a conference from which will come a report on how the liberal arts college can fulfill its role more effectively.

G. DESCRIPTION OF MATERIALS ALREADY PRODUCED: Single copies of any or all of these may be obtained upon request.

Reports

1. "Instruction in General Chemistry and the Expanding Student Population."--September 1964. Ser. publn. No. 3.

2. "Experimental Curricula in Chemistry."--September 1964. Ser. publn. No. 4.

3. "The Content of Introductory College Chemistry."--January 1965. Ser. publn. No. 6.

4. "Thermochemical Investigations for a First-Year College Chemistry Course."--January 1965. Ser. publn. No. 7.

5. "Modern Experiments for Introductory College Chemistry."--September 1965. Ser. publn. No. 11.

6. "Guidelines and Suggested Title List for Undergraduate Chemistry Libraries."--April 1966. Ser. publn. No. 12.

Resource Papers. Reprinted from Journal of Chemical Education:

7. "Ligand Field Theory."--September 1964. Ser. publn. No. 5.
8. "Elementary Chemical Thermodynamics."--February 1965. Ser. publn. No. 8.
9. "Bond Energies."--September 1965. Ser. publn. No. 10.
10. "Isoelectronic Systems."--April 1966. Ser. publn. No. 14.
11. "Atomic Orbitals."--June 1966. Ser. publn. No. 15.

Newsletters

12. Nos. 1 - 6.

H. MATERIALS AVAILABLE FREE: See G.

I. MATERIALS PURCHASABLE: None

J. PLANS FOR THE FUTURE: None described (see F.)

A. TITLE OF COMMISSION: COMMISSION ON COLLEGE GEOGRAPHY (CCG)

B. PROJECT DIRECTOR: Dr. John F. Lounsbury, Commission on College Geography, Eastern Michigan University, Ypsilanti, Mich. 48197. Tel: 313-483-6100, X2092. Chairman: Dr. Paul B. Cohen, Director Graduate School of Geography, Clark University, Worcester, Mass. Tel: 617,791-6241.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B.
   b. Facilities available for viewing: No special facilities or activities available, but visitors are welcome.

D. PRINCIPAL PROFESSIONAL STAFF: John F. Lounsbury, Project Director; Richard D. Hecock, Assistant Project Director.

E. PROJECT SUPPORT:
   a. Organizational sponsorship: The Association of American Geographers.
   b. Funding agency: National Science Foundation.

F. PROJECT HISTORY:
   a. Principal originators: Saul B. Cohen and John F. Lounsbury.
   b. Date and place of initiation: January, 1965. Association of American Geographers, Washington, D. C.
   c. Reason for initiation: To improve courses and programs in college geography.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: The objectives of the Commission are to encourage and coordinate the efforts of specific institutions in developing unique course programs; to develop pertinent materials such as resource materials and annotated lists of relevant published materials; to develop methods to increase the effectiveness of undergraduate teaching; serve as a consulting service to aid institutions or individuals in planning changes in geography curricula; investigate ways to further interdisciplinary cooperations; and work in various other ways to improve geographic education in colleges and universities throughout the country.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: Geography - College level.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Geography in Undergraduate Liberal Education - Commission on College Geography Publication No. 1, 1965.
   2. A Basic Geographical Library, A Selected and Annotated Book List for American Colleges - Commission on College Geography Publication No. 2, 1966.

K. MATERIALS AVAILABLE FREE: Items listed above upon request. Address requests to Project Headquarters.

L. MATERIALS PURCHASABLE: Items listed above, free upon request.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English.

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No plans at the moment to translate materials in other languages.

O. USE OF PROJECT MATERIALS:

a. Number of teachers using materials: Publications Nos. 1 and 2 are widely used in this country and abroad at the college level.

b. Some specific schools where course is being taught: Field trials of newly developed introductory courses - University of Michigan, University of Chicago, University of Cincinnati, and University of Iowa.

P. MATERIALS PRESENTLY BEING DEVELOPED:

3. "Manpower Survey in Geography", estimated publication, January 1967.
4. "Four Introductory Course Outlines", estimated publication, February 1967.
5. "Position Papers Concerning Approaches to College Geography", estimated publication, March 1967.
6. "Development of Major and Minor Programs in Geography", estimated publication, December 1967.
7. "Development of Four New Courses in Climatology and Other Sub-Fields", estimated publication, January 1968.
8. "Development of New Subject Matter Materials - Monographs, Laboratory Problems Kits, Film Strips, Video Tapes", to be developed during the calendar year 1967.
9. "Development of Bibliographic Materials in Selected Sub-Fields", to be developed during the calendar year 1967.
10. "Development of Geography in Area Studies", to be developed during the calendar year 1967.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: Summer Institutes for College Teachers, 1966, 1967, 1968; Regional conferences to disseminate new materials, calendar year of 1967.

R. PROJECT EVALUATION: During the 1967 calendar year, four introductory course outlines being taught at the Universities of Michigan, Chicago, Cincinnati, Iowa, will be evaluated. The evaluation instruments have not been developed to date. This project will begin in the spring of 1967.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Development of four introductory course outlines; publication of A Basic Geographical Library, A Selected and Annotated Book List for American Colleges; publication of the Manpower Survey (Jan. 1967); development of summer institutes for college teachers at the Ohio State University and the University of Minnesota, 1966; development of programs to be carried out in 1967 (program inventory and development; development of subject matter materials - monographs, laboratory problems kits, film kits, etc.; development of bibliographic materials in selected sub-fields; development of new course outlines in climatology and other sub-fields).

T. **PLANS FOR THE FUTURE:** The Commission will meet three times over the course of the 1967 calendar year and several of the Commission panels will hold meetings. Publication of four course outlines and position papers are scheduled for the spring of 1967. Four existing course outlines are being taught during 1967 at selected universities. Summer Institutes for College Teachers will be held in 1967 at the University of Minnesota and the University of Florida.

A. TITLE OF COMMISSION: COMMISSION ON COLLEGE PHYSICS (CCP)

B. PROJECT DIRECTOR: Dr. John M. Fowler, Director, Commission on College Physics, 607 Physics & Astronomy Bldg., The University of Michigan, Ann Arbor, Mich. 48104. Tel: 313-665-8644.

C. PROJECT HEADQUARTERS:
  a. Address: Same as B.
  b. Facilities available for viewing: Library of physics texts, experimental teaching materials, scientific journals and periodical; 8mm film loops; Fairchild film loops; CCP publications and reports; 16mm educational films.

D. PRINCIPAL PROFESSIONAL STAFF: Staff Physicists: Paul R. Camp; Ben A. Green; Richard F. Roth.

E. PROJECT SUPPORT:
  a. Organizational sponsorship: American Association of Physics Teachers.
  b. Funding agency: National Science Foundation.

F. PROJECT HISTORY:
  a. Principal originator: Participants at final meeting of series of three national conferences on the improvements of college physics courses held 1959-60.
  b. Date and place of initiation: First meeting held June 15-16, 1960, New York.
  c. Reason for initiation: "To analyze the aims and substance of college physics courses and the resources for improving such courses, and to formulate plans for the improvement of the teaching of physics at the college level throughout the country." ("Report of Conference on the Improvement of College Physics Courses," Am. J. Phys., 28, 1960).

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: ". . . the Commission considers its primary functions to be the collection and dissemination of information about curricular developments, the critical appraisal of the effectiveness of these developments, the consideration of what additional efforts are needed, and the stimulation of responsible groups of physicists toward course and curriculum development. Actual operations, such as the development, production and distribution of new written materials, apparatus, films, etc., are, of course, the ultimate objectives, but the Commission engages directly in these activities only when it finds urgent needs that are not being met by existing institutions and which do not appear likely to be satisfied by anything less than a national effort for which no present agency exists. . . . (Am. J. Phys., 30, 665, 1962).

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: The Commission is primarily concerned with physics at the undergraduate level.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

Major Reports

1. Instruction by Design - Report of the Working Conference on New Instructional Materials in Physics, held 20 June-21 August 1965 at the University of Washington.

An illustrated report on the teaching materials developed at Seattle: monographs, films, laboratory apparatus, and computer programs. Included also is a description of a collaborative effort between designers and physicists to construct an instructional sequence in elementary kinematics.

2. The Computer in Physics Instruction - Report of the Conference on the Uses of the Computer in Undergraduate Physics Instruction, held 4-6 November 1965 at the University of California at Irvine.

A handbook of current computer technology for physics teaching. Combines discussions of the potential of computer-assisted learning in physics with descriptions of existing computer equipment, physics programs (including a complete flow diagram of an experimental tutorial program on weightlessness), systems already in operation, and available computer languages for use in teaching physics by computer.

3. Proceedings of the Boulder Conference on Physics for Nonscience Majors, held 20-29 July 1964 at the University of Colorado.

A collection of expanded course outlines for several existing physics courses for nonscience students, as well as working papers on physical science courses, laboratory experiments, homework problems, etc. Concludes with a section on techniques and materials potentially useful in reaching the nonscience audience and a bibliography of science books for the nonscience student.

Other Reports

4. Report of an Informal Conference on the Training and Supply of College Physics Teachers, held 9-10 October 1965 in Washington, D. C.
5. Report on the Conference on Interdisciplinary Activities, held 28 June-2 July 1965 at the University of Washington.
6. Report of the First Ann Arbor Conference on Curricula for Undergraduate Majors in Physics, held 14-16 May 1962.
7. Report of the Second Ann Arbor Conference on Curricula for Undergraduate Majors in Physics, held 12-14 November 1962.

Reprints

8. Outline of a Course in Plasma Physics, Sanborn C. Brown.
9. Homemade High Vacuum Techniques, CCP Staff and MIT Science Teaching Center.
10. Undergraduate Curricula in Physics: A Report on the Princeton Conference on Curriculum S, E. Leonard Jossem.
11. Less May Be More, Philip Morrison.
12. Study Programs for College Physics Teachers: An Analysis of Supply and Demand, Arnold A. Strassenburg.
13. Report of a Conference on Physical Science Courses, CCP Staff.
14. The Berkeley Physics Laboratory, Alan M. Portis.
15. Sealing with Solder Glass, Robert H. Dalton.

16. Experiences with Solder Glass and the Student, John G. King.
17. Progress Report of the CCP (June 1962).
18. Progress Report of the CCP (June 1964).
19. Power Supply for Penning Vacuum Gauge, Jan Orsula.

Newsletters

20. Newsletters #1 - 12 are available from the Commission office.

K. MATERIALS AVAILABLE FREE: All the materials listed are available free of charge from the CCP office.

L. MATERIALS PURCHASABLE: All materials are available free of charge.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. USE OF PROJECT MATERIALS: See H - the CCP does not produce teaching materials.

P. MATERIALS PRESENTLY BEING DEVELOPED:
21. Report of the Conference on the Use of the Single Concept Film in College Physics, held January 15-17, 1966, Rensselaer Polytechnic Institute (Troy).

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: The CCP has established a Panel on the Preparation of Physics Teachers to begin the examination of the problems of teacher preparation, recruitment, etc.; it confines for the present its considerations to the preparation of high school teachers.

R. PROJECT EVALUATION: The National Science Foundation reviews activities; the Commission reports to the profession via a biennial Progress Report (Am. J. Phys., 34, 883, 1966). A questionnaire is being produced to evaluate CCP's influence on teaching practices and innovations.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:
Progress Report (Am. J. Phys., 34, 883, 1966).
1/15-17/66: Conference on the Use of the Single Concept Film in College Physics held at Rensselaer Polytechnic Institute.
Panel on the Preparation of Physics Teachers established.
Continuing program concerning physics in small colleges initiated.
10/25/66: Meeting of panel to discuss major curricula.

T. PLANS FOR THE FUTURE: See Progress Report in American Journal of Physics, September 1966 (part II).

A. TITLE OF COMMISSION: COMMISSION ON EDUCATION IN AGRICULTURE AND NATURAL RESOURCES (CEANAR)

B. DIRECTOR OR EXEC. SEC.: Mr. R. E. Geyer, Executive Secretary, Commission on Education in Agriculture and Natural Resources, National Research Council, National Academy of Sciences-National Academy of Engineering, 2101 Constitution Ave., Washington, D. C. 20418. Tel: 202-961-1506 or 961-1604.

C. PROJECT HEADQUARTERS:
   a. Address: Same as B. Contact R. E. Geyer.
   b. Facilities available for viewing: None

D. PRINCIPAL PROFESSIONAL STAFF: R. E. Geyer, Executive Secretary.

E. PROJECT SUPPORT:
   a. Organizational sponsorships: Agricultural Board, Division of Biology and Agriculture, National Academy of Sciences-National Research Council.
   b. Funding agency: National Science Foundation.

F. PROJECT HISTORY:
   a. Principal originator: Organizational sponsor.
   b. Date and place of initiation: 1961, National Academy of Sciences-National Research Council.
   c. Reason for initiation: See H.

G. PRESENT COMMERCIAL AFFILIATIONS: Agricultural Board is affiliated with Agricultural Research Institute, which has largely commercial membership.

H. PURPOSES AND SPECIFIC OBJECTIVES: The Commission has two major purposes. The first is to review trends in education in agriculture for students majoring in agriculture and renewable natural resources; stimulate discussion, re-evaluation and improvement in undergraduate courses and curricula; and prepare recommendations for the development of academic programs in the future. The second is to assist in the development of the agricultural and natural resource aspects of general education. Similar projects or previous programs of this type do not exist in this field.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: All of agriculture and renewable natural resources; primarily undergraduate; also two-year technician level.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
   1. Brochure "Threads of Life," 1964, describes careers in agricultural science, with emphasis on biological science aspects of agriculture. Copies may be obtained only from colleges, schools, and departments of agriculture in institutions of higher education, and not from the Committee on Educational Policy in Agriculture. A list of these colleges, schools, and departments is available from the Commission office.
   2. "The Agricultural Sciences," statement on the nature and challenges of the agricultural sciences, reprint from Bioscience, Vol. 15, No. 5, May, 1965, p. 349.

3. "Farm-Nonfarm Origin and Some Effects on Students in Colleges of Agriculture," Committee on Educational Policy in Agriculture, Mimeo Series Publication #1, January, 1964.
4. "A Survey of Placement, Agricultural College Baccalaureate Graduates, Spring, 1963," Committee on Educational Policy in Agriculture, Mimeo Series Publication #2. (Out of print)
5. "Report of a Seminar on Opportunities in Business for B.S. Graduates of Colleges of Agriculture," Committee on Educational Policy in Agriculture, Mimeo Series Publication #3, June, 1964.
6. "A Survey of Placement, Agriculture and Forestry, July, 1963 to June, 1964," Committee on Educational Policy in Agriculture, Mimeo Series Publication #4, October, 1964.
7. "Minimum Requirements for Bachelor of Science in Agriculture, including Agricultural Sciences, Agricultural Production, and Agricultural Business," December, 1961. (Out of print)
8. Papers: "Trends and Issues in Education in the Agricultural Sciences," by A. E. Darlow, for presentation to the Resident Teaching Subdivision, Agronomic Education Division, Agronomic Education Division, American Society of Agronomy, annual meeting. November 18, 1964.
9. "Report to the Resident Instruction Section, Division of Agriculture, Association of State Universities and Land-Grant Colleges," by A. E. Darlow, Chairman, Committee on Educational Policy in Agriculture, November 9, 1964. (Out of print)
10. "Poultry Science in General Education--and in Recruiting," by Richard E. Geyer, presented to the Poultry Section of the Association of Southern Agricultural Workers, February 2, 1965.
11. "Educational Objectives in the Agricultural Sciences," by George A. Gries, presented at a Symposium on Education in Dairy Science sponsored by Education Section, American Dairy Science Association, June 23, 1964.
12. "Activities of the Committee on Educational Policy in Agriculture," by Richard E. Geyer, presentation at the Poultry Science Department Heads' Breakfast, Poultry Science Association Meeting, August 7, 1964. (Out of print)
13. "The Ferment in Undergraduate Biology--Does It Make Any Difference?" by Richard E. Geyer, presented to the Western Region Meeting of Deans and Directors of Resident Instruction, University of Hawaii, March 11, 1965.
14. "Trends and Issues in Undergraduate Education in the Agricultural Sciences," by Richard E. Geyer, presented at the Southern Regional Meeting of the Deans and Directors of Resident Instruction, Colleges of Agriculture, New Orleans, Louisiana, April 9, 1965.
15. "Activities of the Committee on Education Policy in Agriculture," by Richard E. Geyer, presented at the Meeting of the National Association of Colleges and Teachers of Agriculture, Wilmington College, April 27, 1965.
16. "Excellence in the Education of Future Agricultural Communicators," by Richard E. Geyer, presented during the annual meeting of the American Association of Agricultural College Editors, Rutgers University, July 8, 1965.

17. "Activities of the Commission on Education in Agriculture and Natural Resources," by A. E. Darlow, presented to the Resident Instruction Section, Division of Agriculture, National Association of State Universities and Land-Grant Colleges, Minneapolis, Minnesota, November 15, 1965.

18. "Feed Manufactures of the Future," based on a pilot study by the Committee on Educational Policy in Agriculture, reprint from Feed Age, Vol. 15, No. 10, October, 1965, p. 22.

19. "Trends and Issues in Education in the Agricultural Sciences," reprint from Bioscience, Vol. 15, No. 11, Nov., 1965, p. 711.

20. "Training for Applied Biology," by Richard E. Geyer, presented to the 1965 Summer Institute for Teachers of Introductory Biology at the College Level, Williams College, Williamstown, Massachusetts, July 30, 1965.

21. "Report of Visiting Panel Program - Spring, 1964," dated July, 1965.

22. "Proceedings of the Conference on Undergraduate Education in Dairy Science," August 10-11, 1965, Lincoln, Nebraska, reprinted from the Journal of Dairy Science, (Mo), 1966.

23. "Consolidation of Courses and Curricula in Agriculture," by Richard E. Geyer, presented at the Meeting of Northeast Region Deans and Directors of Resident Instruction, New York, April 5, 1966.

24. "Trends in Undergraduate Education in Renewable Natural Resources," by Richard E. Geyer, presented at the Meeting of the Southern Deans and Directors of Resident Instruction in Agriculture, Tampa, Florida, March 31, 1966.

25. "Outdoor Recreation and Parks Management Curricula in Colleges of Agriculture and Forestry," by Richard E. Geyer, presented at the 15th Annual Governor's Conference on Recreation and Parks, Maryland Recreation and Parks Society, Gaithersburg, Maryland, May 10, 1966.

26. Proceedings, Conference on Undergraduate Education in Horticultural Science, published by the American Society for Horticultural Science, P. O. Box 109, St. Joseph, Michigan 49085, September 1966. Publication can be obtained for $2.00 by writing to the American Society for Horticultural Science at the above address.

(In Process)

27. Proceedings, Conference on Undergraduate Teaching in the Animal Sciences, May, 1966.

28. Papers on Undergraduate Teaching in Poultry Science, presented during the annual meeting of the Poultry Science Association, August 1965.

29. Proceedings, Symposium on Undergraduate Teaching in Agricultural Economics (to be published in the Journal of Farm Economics, February 1967).

30. Proceedings, Conference on Undergraduate Education in the Biological Sciences for Students in Agriculture and Natural Resources, co-sponsored with the National Association of Colleges and Teachers of Agriculture (NACTA), Resident Instruction Section of the National Association of State Universities and Land-Grant Colleges (NASULGC), and the Panel on Preprofessional Training for the Agricultural Sciences (PPTAS), Commission on Undergraduate Education in the Biological Sciences (CUEBS), November 11-12, 1966.

31. Papers from Symposium "Undergraduate Education in the Biological Sciences, Agriculture and Natural Resources," co-sponsored with the Commission on Undergraduate Education in the Biological Sciences, and Section Q (Education) of the American Association for the Advancement of Science (AAAS), December 27, 1967, during the annual meeting of AAAS.

K. MATERIALS AVAILABLE FREE: All of the above except No. 1, and those that are out of print. Address same as in Item C.

L. MATERIALS PURCHASABLE: No. 1 (Threads of Life), available in quantities of 50 or more at a cost of 15 cents each. In order to obtain copies, send a purchase order to the attention of the Printing and Publishing Office, National Research Council, National Academy of Sciences-National Academy of Engineering, 2101 Constitution Ave., Washington, D. C. 20418.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: No plans for translation at present.

O. USE OF PROJECT MATERIALS: Not applicable.

P. MATERIALS PRESENTLY BEING DEVELOPED: See publications in progress, Item J.

Q. SPECIFIC PLANS FOR TEACHER PREPARATION: None

R. PROJECT EVALUATION: Not applicable; no formal evaluation.

S. BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT: Study of biological and physical science and mathematics training needs for undergraduates in agriculture and natural resources; conferences on course and curriculum content in agriculture and natural resources; conference on educational activities of scientific societies; education conferences co-sponsored by scientific societies; panel on two-year institutions; reports on education of scientists and managers in renewable natural resources; study of "Agriculture and Natural Resources in General Education;" visiting panels, task forces and specialists.

T. PLANS FOR THE FUTURE: Continuation and completion of projects listed in Item S. Symposium on Undergraduate Teaching in Animal Science, August 2-3, 1967, University of Nevada, Reno, and Conference on Undergraduate Teaching in Agronomy, November 3-4, 1967 in Washington, D. C.

A. TITLE OF COMMISSION: COMMISSION ON ENGINEERING EDUCATION

B. CHAIRMAN: John R. Whinnery
Address: Dept. of Electrical Engineering
University of California, Berkeley, Calif. 94720
Tel: 415-845-6000 X1030.

C. DIRECTOR OR EXEC. SEC.: Newman A. Hall
Address: Commission on Engineering Education
1501 New Hampshire Ave., N. W.
Washington, D. C. 20036. Tel: 202-232-0350.

D. SOURCES OF FINANCIAL SUPPORT: Foundations

E. OBJECTIVES OF COMMISSION: To provide an objective, independent influence on the quality and performance of engineering educational programs.

F. PROJECTS NOW UNDERWAY:
Build: Bi-University Institutional Liaison for Development.
ECCP: Engineering Concepts Curriculum Project.
COSINE: Computer Sciences in Electrical Engineering.
Design Laboratory Workshops, 1967.
Continuing studies on computer software, case studies computer animation, laboratory development, etc.

G. DESCRIPTION OF MATERIALS ALREADY PRODUCED:
1. Motion Pictures for Engineering Education.
2. Proceedings of Conference on Impact of Computers on Education in Engineering Design.
3. COSINE Newsletter.
4. ECCP Newsletters.
5. ECCP Brochure.
6. CEE Annual Report.

H. MATERIALS AVAILABLE FREE: Nos. 2, 3, 4, 5, 6. All are available from the offices of the CEE.

I. MATERIALS PURCHASABLE: No. 1 - 30 cents; available from the offices of the CEE.

J. PLANS FOR THE FUTURE: None described.

A. TITLE OF COMMISSION: COMMISSION ON UNDERGRADUATE EDUCATION IN THE BIOLOGICAL SCIENCES (CUEBS)

B. CHAIRMAN: Earl D. Hanson
Address: Shanklin Laboratory of Biology, Wesleyan University,
Middletown, Conn. 06457. Tel: 203-347-4421.

C. DIRECTOR OR EXEC. SEC.: Martin W. Schein, Director
Address: CUEBS, Suite 403, 1717 Massachusetts Avenue, N. W.
Washington, D. C. 20036. Tel: 202-232-1166.

D. SOURCES OF FINANCIAL SUPPORT: National Science Foundation.

E. OBJECTIVES OF COMMISSION: The Commission on Undergraduate Education in the Biological Sciences (CUEBS) was established in 1962 to analyze objectively the present status of biology in American colleges and universities. Biologists throughout the country have participated in study panels to make recommendations on ways and means of solving problems in undergraduate biological education. The primary concern of the Commission is to assure that college biology courses reflect the modern discipline by shortening the time gap between the publication of research results and their reporting in the classroom. Program emphasis is on improving and modernizing biology curricula, as well as assisting instructional personnel to keep informed of developments in modern biology.

F. PROJECTS NOW UNDERWAY: The following panels are concerned primarily with curriculum emphasis:

The Panel on Undergraduate Major Curricula has completed a detailed analysis of core curricula at four major institutions. Publications of the results will provide a profile of contemporary biological thought in terms of the education at these institutions.

The Panel on Biology in Liberal Education sponsored a Colloquium in 1965 which turned its attention to the problem of biology in a liberal education. Several working groups are now pursuing approaches suggested at the Colloquium and at Panel meetings.

The Panel on Preprofessional Training for the Medical Sciences is analyzing preferences of health-related professional schools concerning the kind of undergraduate training in biology that their incoming students should receive. When integrated with the core curriculum in biology, this analysis is expected to aid in curriculum design in the various preprofessional programs.

The Panel on Preprofessional Training for the Agricultural Sciences has completed studies which support the concept that in the animal, plant and food science areas, agriculture majors should receive the same biology programs as other biology majors.

The Panel on Preparation of Biology Teachers has recommended a five-year program for high school biology teachers. The program centers on a core curriculum in biology, with a senior seminar on human considerations in biology (including historical and philosophical considerations of man's place in nature and developments which have implications for human biology). Consideration is being given to the development of a Biology Methods Program for use by biology instructors confronted with potential secondary school teachers.

The Panel on Biology in the Two-Year College has a subcommittee developing curriculum recommendations to meet the needs of occupationally-oriented Associate of Arts degree programs.

Instructional support programs, preparation of personnel and facilities development have been the primary concern of the following panels:

A joint task force of the Committee on the Undergraduate Program in Mathematics and CUEBS is planning a source book on mathematical models in biology, and a biology-chemistry interface monograph series is in production. These activities are being carried out by the Panel on Interdisciplinary Cooperation.

The Panel on Instructional Materials and Methods has experimented with the creation of instructional learning packets. A feasibility study is being supported to explore how a Center for Biological Education might provide continuity in the improvement of undergraduate biology.

The Panel on College Instructional Personnel has encouraged regional conferences to bring college biology teachers in closer contact with modern biological knowledge and understanding. Changes which would allow the involvement of more instructors in current programs have been suggested. Guidelines for graduate-level preservice education, emphasizing research experience and techniques of pedagogy, have been developed.

The Panel on Evaluation and Testing has completed work on a biology test item booklet designed to strengthen and improve aspects of evaluation in undergraduate biology courses.

A Panel on Biological Facilities has produced a packet, Guidelines for Planning Biological Facilities, to aid departments in efficiently utilizing construction funds. It is now working on a basic library list to aid undergraduate institutions.

Cooperative conferences between CUEBS and local institutions in a region are being developed. At these meetings CUEBS representatives will interpret the work of the various panels and assist colleges and universities in analyzing their needs and programs.

CUEBS maintains an active Consultants Bureau to assist in evaluation of curricula, departmental programs and planning of renovation and construction of facilities. Inquiries are invited.

G. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. New Directions in Biology Teaching. Thomas S. Hall. (BioScience 14 (4):31-33; April, 1964).
2. Report on the Activities of the Commission on Undergraduate Education in the Biological Sciences, July 1, 1963 to June 30, 1964.
3. Core Studies for Undergraduate Majors: A Report on the CUEBS Berkeley and St. Louis Conferences (BioScience 14 (8):25-29, August, 1964).
4. Some Information about CUEBS.
5. Undergraduate Origins of Nonservice Fellows in the Biological

Sciences.
6. Report of the Western Regional Conference on Courses and Curricula in the Biological Sciences.
7. The Consultants Bureau, 1964-65.
8. Report of the Midwestern Regional Conference on Courses and Curricula in the Biological Sciences.
9. Report of the Northeastern Regional Conference on Courses and Curricula in the Biological Sciences.
10. Report of the Southeastern Regional Conference on Courses and Curricula in the Biological Sciences.
11. Report of the Conference on the Training of Biology Teachers.
12. Preparing the Modern Biology Teacher: A Position Paper of the Panel on Preparation of Biology Teachers. Benson F. Ginsburg, Chairman. (BioScience: December, 1965).
13. CUEBS and the Preparation of Biology Teachers. Ted F. Andrews. (NABT News and Views IX (4), August, 1965).
14. Report of the Panel on Instructional Materials and Methods, December 1964-October, 1966.
15. Biology in a Liberal Education: Colloquium on Biology in a Liberal Education, Stanford University, August 2-13, 1965.

H. MATERIALS AVAILABLE FREE: Nos. 1, 3, 6, 7, 8, 9, 10, 12, 14, 15. The following reprints are also available:
16. Standards for Staff and Facilities in Departments of Biological Science. AIBS Subcommittee on Facilities and Standards (BioScience 13 (6):14-19; June, 1963).
17. Background Thoughts on Curriculum Planning for Biology. Clifford Grobstein. (BioScience 14 (9):29-33; September, 1964).
18. Reward: A Changing World and College Transition. Sumner Hayward. (The North Dakota Quarterly, Summer-Autumn, 1965).
19. Three-Dimensional Grid for Test Item Categorization. Prepared by the CUEBS Panel on Evaluation and Testing. (CUEBS NEWS 11 (2), December, 1965).
20. Higher Education Act of 1965: Whom to See and Where to go for Funds (College and University Business, March 1966).
21. Courses in the Biological and Related Sciences for Students in Agriculture. Roy A. Young (Journal of Dairy Science 49 (5): 565-568; 1966).
22. Defining the Core of a Science. Clifford Grobstein, University of California, San Diego, at La Jolla (The American Biology Teacher, Vol. 28 (10); December, 1966).
23. Basic Principles of Administration. Edwin Goerdt, S.M. (National Catholic Education Association monograph, "What is Happening to Catholic Education". Edited by C. Albert Koob, O. Praem., 1966, NCEA).

I. MATERIALS PURCHASABLE: None

J. PLANS FOR THE FUTURE: Continuation of present programs and exploration of new approaches to the goals defined in objectives of the Commission. Utilizing the resources of various panels, committees, and consultants from throughout the biological community we hope through publications, regional conferences, and consultant visits to make the best in professional judgment and experience from contemporary biology available to colleagues and campuses interested in curriculum analysis, improvement of professional environment, planning of facilities and the general improvement of undergraduate education in the biological sciences. Through intercommission communication, panels and action committees, we hope to increase interdisciplinary support and interlinkage between related sciences where it is appropriate to do so.

A. TITLE OF COMMISSION: COMMISSION ON THE UNDERGRADUATE PROGRAM IN MATHEMATICS (CUPM)

B. CHAIRMAN: Richard D. Anderson
Address: Department of Mathematics, Louisiana State University,
Baton Rouge, La. 70803. Tel: 504-388-2639 or 388-2116.

C. DIRECTOR OR EXEC. SEC.: Lincoln K. Durst
Address: P. O. Box 1024, Berkeley, Calif. 94701. Tel: 415-527-2363
(Director after Sept. 1, 1967: Malcolm W. Pownall - same address).

D. SOURCES OF FINANCIAL SUPPORT:
SPONSORING AGENCY: Mathematical Association of America, SUNY at Buffalo, Buffalo, New York 14214.
SOURCE OF FINANCIAL SUPPORT: National Science Foundation.

E. OBJECTIVES OF COMMISSION: The study and improvement of undergraduate mathematics curricula and mathematics instruction.

F. PROJECTS NOW UNDERWAY: CUPM maintains the following Panels, which report to the Commission: 1) Teacher Training; 2) College Teacher Preparation; 3) Mathematics in Two Year Colleges; 4) Mathematics for Life Sciences; 5) Statistics, and 6) Computing. We also maintain a Consultants Bureau whose members visit individual institutions to give advice and obtain information. Our Advisory Group on Applications refers to the Commission problems arising in applications of mathematics and requiring CUPM study. Our Advisory Group on Communications handles publication policy; this Group has prepared a Basic Library List for undergraduate colleges.

G. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Report No. 1--Five Conferences on the Training of Mathematics Teachers (1961).
2. Report No. 9--Ten Conferences on the Training of Teachers of Elementary School Mathematics (1963).
3. Report No. 10--Annual Report, August 1963-August 1964.
4. Report No. 11--Ten Conferences on the Training of Teachers of Elementary School Mathematics (1964).
5. Report No. 12--Annual Report, August 1964-August 1965.
6. Report No. 13--Eleven Conferences on the Training of Teachers of Elementary School Mathematics (1966).
7. Report No. 14--Annual Report, August 1965-August 1966.
8. Report No. 15--A Summary of the Forty-One Level I Conferences (1967).
9. Recommendations for the Training of Teachers of Mathematics (1961, Revised 1964, 1966).
10. Recommendations on the Undergraduate Mathematics Program for Engineers and Physicists (1962, 1965, 1967).
11. Recommendations on the Undergraduate Mathematics Program for Work in Computing (1964).
12. Tentative Recommendations for the Undergraduate Mathematics Program for Students in the Biological, Management, and Social Sciences (1964).
13. A General Curriculum in Mathematics for Colleges (1965).

14. Course Guides for the Training of Teachers of Elementary School Mathematics (Fourth Draft, 1964).
15. Course Guides for the Training of Teachers of Junior High and High School Mathematics (1961).
16. Mathematics Text Materials for the Undergraduate Preparation of Elementary School Teachers (1965).
17. CUPM Basic Library List (1965).
18. Teacher Training Supplement to the Basic Library List (1965).
19. Pregraduate Preparation of Research Mathematicians (1963,1965).
20. Preparation for Graduate Study in Mathematics (1965).
21. A Curriculum in Applied Mathematics (1966).
22. Mathematical Engineering: A Five Year Program (1967).
23. Consultants Bureau Brochure.
24. Calculus and the Computer Revolution, by R. W. Hamming (1966).
25. The Numerical Integration of Ordinary Differential Equations, by T. E. Hull (1966).

H. MATERIALS AVAILABLE FREE: All of our publications are available free upon request to the Director. Requests for multiple copies should be accompanied by a description of the proposed use.

I. MATERIALS PURCHASABLE: See H above.

J. PLANS FOR THE FUTURE: We expect to be extremely active in studying the problems of college teacher preparation and of two year colleges. Another large project will be the collection, study and publication of a list of mathematical models in biology. Our Panel on Statistics and our Panel on Computing, although new, promises to be active.

A. TITLE OF COMMISSION: COUNCIL ON EDUCATION IN THE GEOLOGICAL SCIENCES (CEGS)

B. PROJECT DIRECTOR: Dr. John W. Harbaugh, Executive Director, 701 Welch Road, Suite 303, Palo Alto, Calif. 94304. Tel: 415-328-0171. CEGS Chairman: Dr. W. W. Hambleton, Kansas Geological Survey, University of Kansas, Lawrence, Kan. 66044. Tel: 913-UN 4-3101.

C. PROJECT HEADQUARTERS:

a. Address: Council on Education in the Geological Sciences, 701 Welch Road, Suite 303, Palo Alto, Calif. 94304. Tel: 415-328-0171 or 328-0172. Contact Dr. John W. Harbaugh, Executive Director.

b. Facilities available for viewing: Nothing is available at our present level of operation, but we hope to increase our visitor facility by 1968.

D. PRINCIPAL PROFESSIONAL STAFF: Dr. John W. Harbaugh, Executive Director. A Professional Development Director and Associate Director, and a Materials Development Director, are being sought at the present time, along with several other professional geologists who will serve on a consulting level.

E. PROJECT SUPPORT:

a. Organizational sponsorship: The American Geological Institute.

b. Funding agency: National Science Foundation.

F. PROJECT HISTORY:

a. Principal originator: The American Geological Institute. The original name of the enterprise was GEO-Study. The original Steering Committee consisted of: W. W. Hambleton, University of Kansas; James R. Beerbower, Lafayette College; Rudolph W. Edmond, Augustana College; Raymond C. Gutschick, University of Notre Dame; Richard H. Johns, Stanford University; C. F. Prouty, Michigan State University; Chalmer J. Roy, Iowa State University; Robert C. Stevenson, AGI; Robert L. Heller, University of Minnesota at Duluth; George R. Waggoner, University of Kansas; John Snyder, AGI.

b. Date and place of initiation: July 25-27, 1963, Boulder, Colorado.

c. Reason for initiation: GEO-Study was undertaken in response to charges that geology lacked purpose and direction, that its curricula are outmoded and obsolete, that it is static, and that it no longer attracts gifted students. The purpose of GEO-Study was to discuss these problems in some detail, outline possible solutions to these problems, and provide direction for future GEO-Study activity.

G. PRESENT COMMERCIAL AFFILIATIONS: None

H. PURPOSES AND SPECIFIC OBJECTIVES: To ascertain in depth the types and relative importance of skills that geologists actually use now, the skills that ideally could be used now, and the skills needed in the future; to establish a service that will assist employers of geologists, including government, industry and private research organizations, to more effectively utilize geolotists; to devise a series of curriculum and course content guides for

University Geology Departments which will promote effective instruction in those skills, particularly with intended utilization of the geologists being trained in mind; to develop instructional material, including monographs, problem brochures, laboratory apparatus, and computer simulation techniques, that will permit a problem-oriented approach to be adopted in instruction, particularly in introductory geology courses; to develop and stimulate an effective program of upgrading skills of professional geologists through an integrated plan involving self-study, participation in formal courses, and personnel exchanges; to increase the rapport between industry and universities in terms of understanding each other's objectives, and in terms of increased interaction between the academic level and the industrial level.

The Council on Education in the Geological Sciences has this year undergone a complete reorganization in its purpose and objectives. Up to this point we had been an introspective organization; it is now the intent of this organization to develop many of the ideas which are the result of the three years of introspection.

I. SPECIFIC SUBJECTS, GRADE AND AGE LEVELS: CEGS concentrates on undergraduate education in college geology.

J. DESCRIPTION OF MATERIALS ALREADY PRODUCED:

1. Several articles concerning the work of CEGS have been published in the Journal of Geological Education. Included in this series of articles are short reviews describing specific problems in geology, bibliographies dealing with geology and the cognate sciences, and articles describing the work of CEGS.
2. "Courses in Geology for Advanced Non-Majors," by John Eliot Allen.
3. "Earth Science Teacher Preparation," by James H. Shea, William M. Merrill, John W. Shrum and others.
4. "Geology as an Interdisciplinary Experimental Science," by O. T. Hayward.
5. "Mathematics Recommendations for Undergraduate Geology Students," by GEO-Study Mathematics Panel.
6. "Evolution as a Geologic Concept: An Introductory Geology Course," by Leo F. Laporte.
7. "Shock Processes in Geology," by Nicholas M. Short.
8. "Heat Flow in the Earth," by Gene Simmons.
9. "Experimental Petrology: An Indoor Approach to an Outdoor Subject," by Peter J. Wyllie.

K. MATERIALS AVAILABLE FREE: Each of the articles listed above are sent to Geology Departments across the United States and Canada.

L. MATERIALS PURCHASABLE: Additional copies of these articles may be obtained from the American Geological Institute, 1444 N Street, N. W., Washington, D. C., 20005.

M. LANGUAGE IN WHICH MATERIALS WERE WRITTEN: English

N. LANGUAGES INTO WHICH MATERIALS HAVE BEEN OR WILL BE PRINTED IN TRANSLATION: None

O. **USE OF PROJECT MATERIALS:** Because of the newness of our materials, none are sufficiently developed for dispersal; however, we hope to eventually have these utilized in Geology Departments across the U. S. and Canada.

P. **MATERIALS PRESENTLY BEING DEVELOPED:**

10. A series of problem-oriented brochures which will be for use on the introductory geology laboratory level.

11. A series of bibliographies as follows: (a) Paperbooks for interested teachers in Earth Sciences; (b) Geology and chemistry; (c) Geology and mathematics; (d) Geology and physics; (e) Monographs; (f) Textbooks.

Q. **SPECIFIC PLANS FOR TEACHER PREPARATION:** Teacher preparation in the field of geology is handled through our sister organization, The Earth Sciences Curriculum Project, located in Boulder, Colorado.

R. **PROJECT EVALUATION:** At this point in our development of classroom aids, we are not prepared to answer this question.

S. **BRIEF SUMMARY OF PROJECT ACTIVITIES SINCE 1966 REPORT:** The project has undergone complete reorganization since 1966. It has a new director and will have three new and previously non-existent positions on the professional level; it has moved its office from Texas to California; the face of the organization has changed from that of an introspective one to that of one which is developing the ideas previously discussed. We are now producing a Newsletter.

T. **PLANS FOR THE FUTURE:** An itinerary of our future plans is being prepared.

Science and Mathematics Materials Received from U. S. State and Local Systems

Newly Published Science and Mathematics Materials
Received from State and Local Systems

The following newly published materials have been received at the International Clearinghouse. These titles update the comprehensive list found in Section III of the 1966 Report. The materials are filed in the Clearinghouse Archives, where they are available for visitor viewing.

ARIZONA - Phoenix Union High School System, Phoenix, Arizona. Curriculum Guide for General Mathematics 1 - 2 and General Mathematics K - 2C, 1966. Curriculum Guide for Introduction to Algebra 1-2-3-4, 1966. Curriculum Guide for Senior Mathematics Review 1-2, 1966.

IOWA - Des Moines Independent Community School District, 1800 Grand Avenue, Des Moines, Iowa 50307. LAMP (Low Achiever Motivational Project).

NEW MEXICO - Albuquerque Public Schools, General Mathematics I, General Mathematics II, 1966.

NEW YORK - The University of the State of New York/The State Education Department, Bureau of Secondary Curriculum Development, Albany, New York. Science 7, 8, 9: Living With the Atom, Block L, 1966. Physics Supplement, 1966. Chemistry - A Syllabus for Secondary Schools, 1966. Chemistry Supplement, 1966. Biology - An Experimental Syllabus, 1966 Edition. An Experimental Course in Mathematics for the Eighth Year, Units 5, 6, 7, 1966. Elementary School Mathematics, A Parents' Guide, 1966. An Experimental Course in Mathematics for the Twelfth Year, 1966.